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RC F GT3 concept shown. *Ratings achieved using the required premium unleaded gasoline with an octane rating of 91 or higher. If premium fuel is not used, performance will decrease.
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THE SAME SOUL.



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Government 5-Star Safety Ratings are part of the National Highway Traffic Safety Administration's (NHTSA's) New Car Assessment Program (www.safercar.gov). Tests include driver and passenger front, side and side barrier and pole tests.

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Lap Dance

LIGHTNING LAP

2016's hottest performers meet their nemesis: Virginia International Raceway.

by K.C. Colwell, Josh Jacquot, Tony Quiroga, Aaron Robinson, and Eric Tingwall

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We hustle the redesigned Ridgeline across the border to the great white north. Is the Honda an escape from domestic-truck convention or an embrace of pickup provincialism?

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2017 Chrysler Pacifica Limited vs. 1984 Plymouth Voyager LE.

by John Pearley Huffman

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2015 MAZDA 3

The top-of-the-line version of Mazda's entry-level car is outsized excellence on a miniature scale.

by Jared Gall

On the Cover

A diverse selection of vehicles we beat up at this year's Lightning Lap.

photography by Marc Urbano

Car and Driver. vol. 62, no. 4

In this Issue:

“At the limit, it delivers fear, gratification, and euphoria—in that order—high-speed corner after high-speed corner.”

—K.C. COLWELL, “LIGHTNING LAP”

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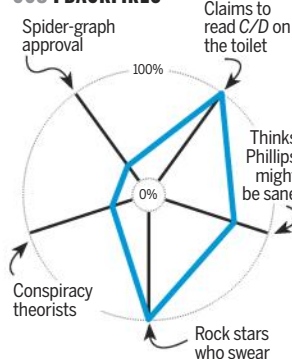
This little guy erupts from Fuji refreshed and refined.

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Derek Bell.

On the Web

HOW TO SELL YOUR CAR THE MODERN WAY

We put seven online services to the test. CarandDriver.com/modernsale

2016 CAN-AM SPYDER F3

The strange snowmower gets a new engine. CarandDriver.com/Can-AmSpyder

2017 FIAT 124 SPIDER AUTOMATIC

The automatic result of messing with Mazda's perfection? CarandDriver.com/124Spiderauto



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Backfires: The joyful noise of the commentariat, rebutted sporadically by Ed.

COVERED

The front-cover fold-out advertisement in your July 2016 issue might be the most irritating thing ever. Well, right behind left-lane squatters and check writers in the grocery store. Keep up the good work otherwise.
—Darren DuKate
St. Louis, MO

The 2017 Chevy Corvette Grand Sport is not simply the best Corvette ever, it is the best f**king car General Motors has ever made.

—Tom Nelson
Somers, WI

Wouldn't fit on the cover—Ed.

FONT OF DESIGN

Again with a design change [“Gleaming the Cube,” July 2016]? Looks like you went with the ADHD theme. You have to be the most insecure periodical on the market. Would you like me to send you a *Car and Driver* from the 1980s to remind you what a car-enthusiast magazine should look like?

—David Orlins
Muscatine, IA

Talk about presentation. The new spider charts are a tremendous improvement! Kudos to *Car and*

Driver for transforming those simple, intuitive, bar-graph comparisons into exhausting, convoluted spider charts. Where's the fun in gleaning relevant, comparative information with just a glance or two, when the task can readily be converted into a frustrating, laborious chore? I was so inspired by the challenge of deciphering the spider charts that I've begun reading the articles exclusively through the eyepiece of a kaleidoscope.

—Hal Feinberg
Camarillo, CA

Just a few words on the “new look”:
+ Still great writers, wonderful wit and wisdom in the reviews, great photos, excellent tech sidebars.

— Font size way too small (just turned 60), trying too hard to be “artsy,” spider graphs and all graphs suck, danger of 30-year subscription being canceled.
= If you do something very well, don't screw with the formula. You're trying to be the magazine equivalent of flavored vodka and the original is

“PAGE NUMBERS ARE LIKE WHEELS ON A CAR, THEY SHOULD ONLY BE IN THE BOTTOM CORNERS.”

awesome and pure. Thanks for a great run. I hope it doesn't have to end.
—Geoffrey Jones Sr.
Highland, NY

Looooooooongtime subscriber. And, notwithstanding my dislike of the spider charts, I just re-upped for two more years.
—Don Mitchell
Atlanta, GA

are now back at the bottom of the page. Thanks! Page numbers are like wheels on a car, they should only be in the bottom corners.
—Raymond Natali
Ledgewood, NJ

I think this is my fourth letter about your ridiculous graphs. When are you going to publish one of them?

—Kent Logan
Black Mountain, NC

Logan, we publish ridiculous graphs all the time—Ed.

I know the dollar is getting weaker and I am getting older (DOB 1946), but by God your fonts are so small I need a magnifying glass to read the stories!

—Errol H. Stambler
Los Angeles, CA

When I got to page 30 and saw the yellow border at the bottom of the page and the solid black line, I thought, “This is an obituary for John Phillips.”

Fortunately, it was not. So stop scaring us. Thanks.

—Joseph Arellano
Elk Grove, CA

Wow, just opened up the July issue and I see the page numbers



Just a minor niggle. *What the hell are you guys doing with the font size?* Okay, so I'm 72 and yes, I do wear glasses, but jeez, give a guy a break. Your new format has reduced the type size again. Of course, the advertising is readable. Just the articles are becoming a real challenge.

—Rick Bradley
Canandaigua, NY
Guys, the new fonts are the same size or bigger than before—your vision is just getting worse. Abandon your smartphones and go back to the Jitterbugs—Ed.

I am 11 years old and obsessed with cars. I read C/D all the time and am always eagerly awaiting the next issue. So, when I got the July issue, I was immediately interested in the redesigned C/D. The new design and look of the magazine is awesome. It is sleek, modern, and much like the new cars you test. I love your magazine, and the new design has made

me love it even more.
—Connor Wallans
Ottawa, ON

DIAL C FOR COMPACT

I wish your "Elementary" comparo [July 2016] would have included the six-speed manuals for the Honda Civic and Mazda 3, not the automatics. You would have needed to test the Civic LX as no other Civic model offers a manual. I think the Mazda would still win by a slight margin with both cars scoring higher in the "fun to drive" category plus the cost savings of the manuals. It is also more fun ordering a new car with a manual, as the salesperson is usually speechless for several minutes. Imagine that.

—Bill Waters
Perry, OH

Regarding July 2016's "Elementary" comparison test: Why didn't the test include a Volkswagen Golf? The 1.8T Golf is in that price range, is fun and practical, and falls in line with the featured

cars specs-wise. It would've been about as quick as the fastest cars in the article, while having fuel economy no worse than the most thirsty of the cars compared. Surely it's more desirable than a Nissan Sentra or a Hyundai Elantra. I would suggest that it's natural competition for the Mazda 3 and the Civic. The GTI isn't the only VW that deserves a look.

—Mike Smith
Huntington Station, NY

The Golf is a hatchback. Now, if you're wondering about the Jetta, we would have included one in this sedan test, but it placed second to the Mazda 3 in our June 2014 comparison of small cars. Because it hasn't been significantly changed since then, it wasn't invited for this round—Ed.

Two cars in July's informative comparison of small sedans have Atkinson-cycle or Atkinson-capable four-cylinder engines. At first, I thought the

name had something to do with small, lawn-mower motors. I'm a big Mazda fan, so please explain.

—DS Holmes
South Hill, WA
[See "Explained"]

I would like to know why the Mazda tested was the highest trim level while the Honda wasn't even the mid-grade. The Civic EX's price range was much lower than almost all the other cars. I am very upset with the results of this test and feel that there is a Mazda bias within the magazine, as most of the comparisons of late have put Mazda on top. I own both a Mazda and a Honda, so I am partial to both. I'll put my 2016 Civic Touring up against the Mazda 3 Grand Touring any day. Just ranting from one of your loyal readers.

—Daniel Schriver
Hampton, VA

We wanted the popular engine in each car, and the EX is the highest trim level offered with the 2.0-liter four-cylinder engine—Ed.

Explained: The Atkinson cycle

In Atkinson-cycle operation, a cylinder's intake valves remain open after the piston has passed bottom dead center, allowing a portion of the intake charge to be pushed back into the manifold before the valves close. This makes the power stroke longer than the effective compression stroke, and, compared with an engine running the conventional Otto cycle, a greater portion of the energy released during combustion is converted into torque. This is not to say that more torque is generated, however. The Atkinson cycle raises efficiency but reduces peak output because it reduces the amount of air available for combustion.

The Atkinson cycle is commonly applied to hybrid powertrains where efficiency is king and an electric motor can compensate for lost low-end torque. Atkinson-capable engines use variable valve timing to switch between the Otto cycle during high-load operation and the late-closing intake valves of the Atkinson cycle during low-load cruising.
—Eric Tingwall



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BENT ON BENTLEY

In the “Bentley on the Rocks” test [July 2016], you had a comparison of the Bentley’s competitors and said: “There are cheaper ways to accelerate 5000-plus pounds of metal and leather. None, however, are as quick and as quiet as a Bentley.”

At a zero-to-60-mph time of 3.2 seconds, with a silent electric engine and a sticker price of \$116,700, the Tesla Model X P90D is quicker and quieter than the Bentley Bentleyga.

So, with this information, I’m wondering if C/D excluded Tesla in the July comparison because you are sponsored by Shell V-Power Nitro+, and if an electric car is quicker, quieter, and cheaper, then customers might opt to purchase a car that wouldn’t consume any of your sponsor’s product.

—Nate Tucker
Gilbert, AZ

That’s some conspiracy theory you’ve got there. But the truth is that the Tesla Model X P90D

might be quicker to 60 mph than the Bentley, but it’s not quieter at 70—Ed.

I never thought anything would make the BMW X5 M look like a practical car for value-minded buyers, but apparently if I can suffer making it to 60 mph in 3.8 seconds instead of 3.5, I get to keep \$130,000 to spend on a 911 or whatever. (Yes, I figured out your spider chart.)

—Colin Teubner
Oakland, CA

M4 PLAY

Just finished the article on the BMW M4 GTS’s steam engine [“Attractive,” June 2016], and boy, does it do my heart good to see water contributing to thrust once again. While the article says WWII-era airplanes used it, I was flying the venerable KC-135A until 1993, and that model flew a few years more before the rest were converted to “R” models with (sadly) no steam at all. The A model’s J57 jet engines produced about 12,000 pounds of thrust sans water, and about 16,000 with it.

Same principle works for jets—cool the air, make it more dense, and *voilà*, higher mass flow rate. Unlike the M4 GTS, however, our 670 gallons lasted just over 120 seconds, giving the navigator the job of making a “110 second” call so we could get the flaps up before it ran out. This was highly recommended, as running out of water “prior to retracting flaps and gear may place the aircraft in a situation where it can neither climb nor accelerate.” A nice euphemism for “everyone’s gonna die.”

—Joe Lenertz
Colonel, USAF,
Retired
Williamsburg, VA

RUNNING ON E

I enjoyed a Bass ale before dinner and a glass of pinot noir with. Then, I happened to read “Let It Burn” [June 2016]. Made perfect sense to me. *In vino veritas.*

—Jay Detweiler
Goshen, IN

You should try reading it in a bowling alley after a few of those Budweisers in pin-shaped bottles—Ed.

B



Aaron Kiley

1952–2016

For 32 years, veteran shooter Aaron Kiley was C/D’s “house photographer,” outlasting four editors and eight art directors. He photographed more than 1500 road tests and was responsible for more than 85 covers. He said he spent “half a lifetime waiting in the bushes on the outsides of corners, trying to capture cornering and drifting action,” which led to innumerable discussions with agitated cops. It is fair to say that, in the 1990s in particular, the look of C/D was largely of Aaron’s making. Once, in response to an assignment to “put something interesting” in the bed of a Subaru Baja, he rented two tigers.

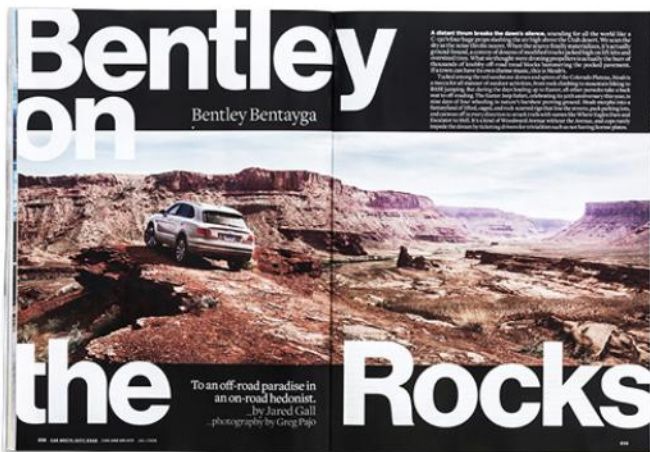
On June 22, Kiley was a student in a glider that crashed in the French Alps, near Authon. His instructor sustained serious injuries but survived. Aaron did not. He was 64.

Aaron grew up in Vermont, with, as he put it, “30 chickens, 7 siblings, 6 ducks, 5 turkeys, 4 dogs, 3 cats, 2 parents, 1 skunk, and 0 accountability.”

In the last few years, Aaron had expanded his repertoire to landscape and aviation photography. He was an avid pilot. His father was renowned landscape architect Daniel Urban Kiley.

Aaron leaves behind his wife, Susan, and two sons, Oliver (35) and Joseph (22), as well as an army of grieving car enthusiasts and friends. —John Phillips

“I NEVER THOUGHT ANYTHING WOULD MAKE THE BMW X5 M LOOK LIKE A PRACTICAL CAR FOR VALUE-MINDED BUYERS... I GET TO KEEP \$130,000 TO SPEND ON A 911 OR WHATEVER.”



BOXSTER DAY

I was first surprised by your comments on the Porsche 718 Boxster's electric steering ["Improved. But Better?" July 2016], "a car that offers steering weight, response, and feel as good or better than anything else sold today." After owning an '84 911 Carrera, with the best steering I've ever experienced, and now owning an '03 Boxster with good, but not as good steering, I drove the Spyder. I really liked it, and I almost bought it. The steering ruined the car for me. It steered perfectly one way, from me to the car. Feedback barely existed, it felt more like my truck than my Boxster.

Then I re-read it. The steering may be "better than anything else sold today," or it could be the Alfa Romeo 4C.

—Mark Schmidt
Lee's Summit, MO
It's not the 4C—Ed.

Just read the review of the Porsche 718 Boxster in the July issue and you have

confirmed my fears: The four-cylinder engine sounds like a dog. Your assessment of the joy of shifting, and now the lack of it in the new model, also resonated with me. I have a 2005 Boxster S that I absolutely love. I have been thinking about a newer Boxster, and thanks to your honest assessment of the 2017 version, it looks like I will be searching for a good, used 2013–2016 car.

—Greg Eick
White Bear Lake, MN

CHARM BRACELET

Kudos to Jaguar for their Activity Key bracelet ["Pace, Space, Etc." July 2016]! You guys nailed the parallel, too. Back in the late '80s, I bought a Ford Taurus SHO based on the reviews in *C/D*. Of course, the best thing about that car was that high-winding Yamaha V-6. However, I couldn't believe how quickly the keypad door locks jumped near the top of my favorite features list.

In those days, I regularly worked out

by jogging or rollerblading around our city lakes, and I would cool down with a swim while all my stuff (including my keys) was locked in the car. These days, keyless-ignition fobs are nothing but expensive and delicate little hindrances to participating in watersports.

—Alan Plotz
Maple Grove, MN

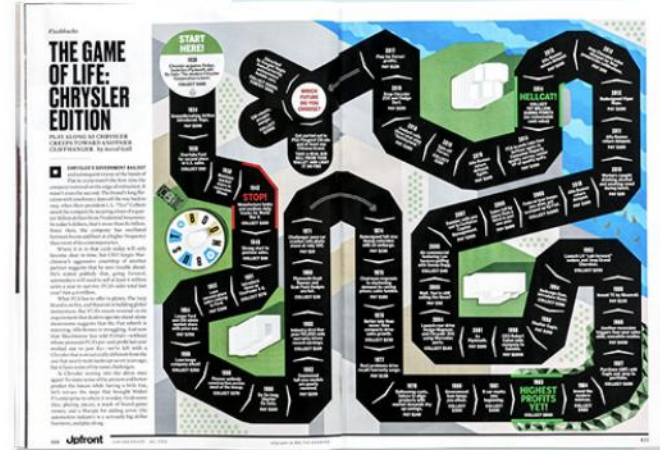
FOUR FOR FIGHTING

While I would also choose the V-6 over the turbo 2.0-liter Chevy Camaro ["A Case for the V-6," July 2016], I would hardly go as far as saying the four is "for no one." If I were to test-drive it, I would probably like it. And I'm a dyed-in-the-wool V-8 guy whose first car was a 1968 327 Camaro. A turbo-four Camaro can't be that bad, Quiroga.

—Bruce Hines
Toronto, ON

SEEING STARS

Reading Jared Gall's "The Game of Life: Chrysler Edition" [July 2016] and I note that Chrysler was doing \$200 for the



flop of the Dodge Viper's redesign and another \$20 for workers caught getting loaded during lunch, but not even a mere mention of the creation and introduction of the Viper in the first place? Yet the Hellcat is mentioned. What's up with that?

—R. Terry Basey
Monrovia, CA

FORKED TONGUES

I really enjoy your magazine, as does my young grandson; however I was astounded as I began to read the Eddie Van Halen interview ["Runnin' with the Devil," July 2016]. In the response to the

Letter of the Month:

I loved your Game of Life: Chrysler Edition. I worked at Chrysler from 1976 to 1985, and I got to experience part of the game firsthand. What you should really do is take a look at all the companies that have been left to die while Jeep moved on to new owners—Willys, Kaiser Motors, American Motors, Renault, Chrysler, Daimler-Chrysler, and Chrysler Group LLC. Jeep just keeps growing, but somehow its owners always go bankrupt or are acquired by other companies. Perhaps Bantam laid a curse on Jeep after the U.S. government took Bantam's design and gave it to Willys? Is FCA next?

—John German
Ann Arbor, MI

Hey, aren't you the guy who discovered VW's cheating?—Ed.

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second point on his new Porsche 911, the following sentence is totally inappropriate as it reads, "We raced in the f.....g rain," and young folk who enjoy the magazine are exposed to this language in a publication that one hopes will lead them to being car enthusiasts and not [fans of] this type language.

—George Owen
Burlington, NC

RESALE SHOP

Your article states that a typical vehicle loses half of its original value within the first three years ["Safe Bets," July 2016]. What is original value according to NADA? Is it the manufacturer's original MSRP or is it based on average actual transaction prices?

—Joe Stefens
Emmaus, PA

Per NADA, the data reflects the "average typically equipped MSRP"—Ed.

THE RISE OF THE MACHINES

Your article ["How we see it: Autonomy,"

July 2016] should be in the same book where they keep "famous last words." Almost the same thing was said about flying and, later, the sound barrier. Don't you think it's a bit premature? "Will never happen" and "will never be" should never be in your magazine.

—Pierre Drolet
Cap-Santé, QC

Vehicle automation will come to halt in a pool of blood at Stage 4 (Conditional Automation) when it becomes obvious that only licensed racers and C/D readers will be paying sufficient attention to "intervene as necessary."

—Skip Ferry
Branford, CT

AIR RACES

When I first heard of the "racing street cars" bill, I was appalled. Another example of Big Government ruining a way of life! Reading John Phillips's column ["Why shouldn't race cars run clean?" July 2016]

"ALMOST THE SAME THING WAS SAID ABOUT FLYING AND, LATER, THE SOUND BARRIER. DON'T YOU THINK IT'S A BIT PREMATURE?"

had me thinking about it, though, and I think he is correct. Racing is racing, and if the playing field is level, it won't matter much if the cars are or remain emissions compliant. (Assuming Volkswagen doesn't get involved.)

Now, just because Phillips is right about this one thing doesn't mean he's *not* insane.

—Ron Russell
Tucson, AZ

I'm a fan of C/D and was even featured in a February 2005 "Specialty File" article. John Phillips has always been entertaining, but he lost me with his agreeing with the EPA concerning racing engines and the crackdown on aftermarket components. I hope he lives long enough for the EPA to require him to shove a filter or catalytic converter up his a**.

He needs to jump in his Nissan Leaf, go write for *Mother Earth News*, and leave the car business alone.

—Norman Holley
Royston, GA

PORCELAIN DEPT.

Noticed a lot of throne references in the July letters to C/D until I realized that I, too, am a regular C/D reader when I am regular.

—Al Strohmaier
Chesterland, OH

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Upfront

Reveal of the Month

UPSCALA

CADILLAC'S ESCALA CONCEPT ARRIVES
MAKING PRODUCTION NOISES. *by Josh Jacquot*

■ **IT'S HANDY FOR CADILLAC** that the name of its latest concept car, Escala (or “scale” in Spanish), sounds a lot like Escalade. There’s a nice link there to the brand’s best-selling SUV, plus it slides off the tongue more easily than, say, CT8, which is what the Escala might be called in the very likely event that some version of it reaches production.

This concept, which made its debut at the Pebble Beach Concours d’Elegance in August, is the latest in a string of Cadillac show cars (see Ciel and Elmiraj) hinting at a large flagship to compete

If the Escala concept is an accurate predictor, Cadillac’s biggest sedan will be an Audi A7–like hatchback and will wear the face of a remorseless predator.

with luxury icons such as the Mercedes-Benz S-class and the BMW 7-series.

The Escala’s dimensions confirm those targets and would make it the biggest car in Cadillac’s stable. The brand’s upcoming twin-turbo 4.2-liter DOHC V-8 powers the Escala and is a good bet for any production model to follow. Based on the Omega platform, which it shares with Cadillac’s CT6, the Escala grows in all the dimensions you’d expect a concept car to grow.

“It has a longer dash-to-axle, is wider, lower, and has bigger wheels than CT6,” says Taki Karras, the Escala’s exterior-design manager. Its wheelbase is longer than the CT6’s by 4.7 inches while overall length grows by 6.5. Front- and rear-track widths grow by 2.7 and 2.5 inches, respectively. In other words, it’s proportioned perfectly to be toned down for production and still be the right size for the segment.





▼ EXTERIOR

The Escala ushers in a new design language, but though the aging Art and Science theme is gone, it's not totally forgotten. Expect the brand's heritage, and not an overall theme, to drive design, according to Cadillac reps. So the Escala keeps the lineal refinement and sophistication but loses the hard-edged design cues of Art and Science; it's not unlike what Cadillac did in the early '60s by leaving towering tail fins behind.

Karras uses the 1967 Eldorado coupe to demonstrate what he hopes to capture with the Escala. Simplicity is a word he uses a lot. "Luxury is about whispering and not overpowering," he says. We wonder if anyone whispered Audi S7 to him as he penned the Escala's sweeping rear roofline. Yes, the Escala is a liftback. In fact, one of the few items sure to be axed from a production version is the show car's high trunk liftover. Its tail lacks the necessary cutline to create a bumper-height trunk opening. Typical Mercedes buyers aren't likely to lift an international-sized suitcase to belly-button level, but, if they did, the Escala offers a load floor that rises automatically to receive luggage.

Vertical light arrangements, long-standing Cadillac design elements, remain on the Escala. Unlike the cars in Cadillac's current lineup, however, the Escala's nose also includes a distinctly



To the current Cadillac models' vertical lighting arrangements, the Escala concept adds horizontal elements.

horizontal LED array, which serves as both daytime running lights and turn signals.

The brushed-aluminum brightwork on the bumpers and front doors is accented with a polished beveled edge. There's a large aluminum element spanning the cutline between the front doors and fenders that moves with the doors, submerging into the body when they're opened. "It's designed to look functional, like it supports the door," says Karras.

Twenty-two-inch two-piece wheels neatly hide the lug nuts, and they wear tires with chevron tread patterns.

▼ INTERIOR

Interior-design manager Jennifer Kraska emphasizes that the Escala's economy of lines continues inside. But, she says, "simple is hard. It can easily fall apart and look unrefined."

Brushed-aluminum, American walnut, and leather trim abound in the cabin. Unlike in most concept cars, though, so does fabric. In fact, the organic LED instrument panel—a thin, layered arrangement—floats in a sea of fabric and wood.

Minor concept-car contrivances aside, the Escala appears closer to reality than its Ciel and Elmiraj predecessors. The platform, the engine, the basic shape, and even the promise of a flagship model from Cadillac's CEO, Johan de Nysschen, all exist, making it likely that an Escala with a window sticker will soon appear in some form.



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TREAD QUIETLY

ACOUSTICALLY INSULATED TIRES ARE SUPPOSED TO HUSH ROAD THUMPS. BUT CAN YOU REALLY HEAR THE DIFFERENCE?
by Eric Tingwall



001
YES, IT REALLY IS THAT SIMPLE. ACOUSTICALLY INSULATED TIRES USE A RING OF POLYURETHANE FOAM BONDED TO THE INNER LINER TO QUIET THE RESONANT PING OF TIRE IMPACTS. OR AT LEAST THAT'S THE THEORY.

YOUR VEHICLE'S TIRES are rolling kick drums. Keith Moon played two; your car plays four. Expansion joints, potholes, and heaves pound the rubber, which compresses the air inside and transmits hollow thuds to the cabin.

As cars get quieter, engineers are working to stifle the drumbeat of tire impacts. Their current favored method is polyurethane insulation glued around the tire's inner liner. These acoustically insulated tires have stealthily spread through the market to the point that they are now offered by all the major tire manufacturers and come installed from the factory on several high-end luxury vehicles, including those hallmarks of tranquility, the Mercedes-Maybach S600 and the Tesla Model S.

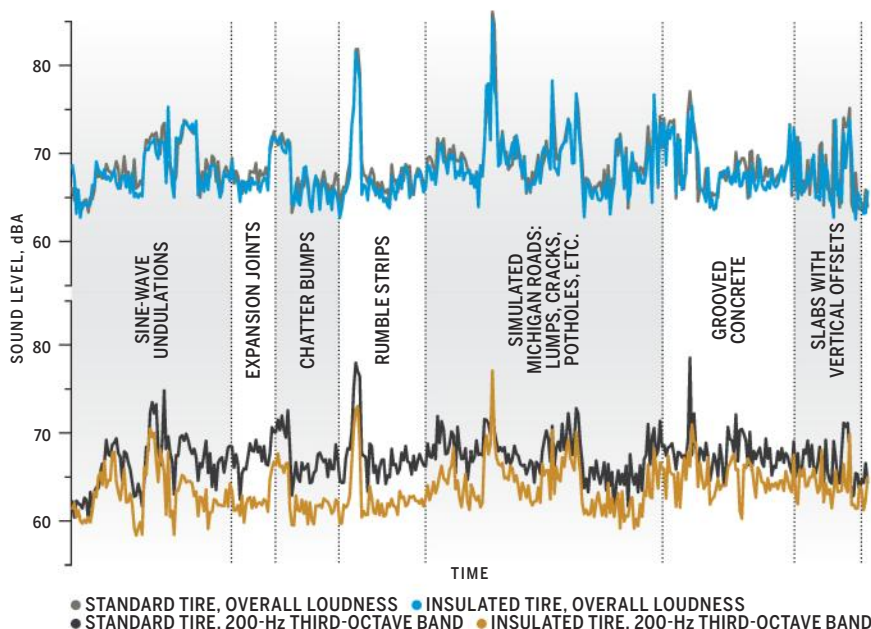
Tire manufacturers see big potential for the technology as electrification silences powertrains, making tires one of the most obvious sources of sound intrusion. The main function of inner tire insulation is to improve the tire sound quality, specifically by absorbing impact noise. In actuality, it reduces overall cabin volumes

only slightly. It has the greatest effect on frequencies near 200 hertz (Hz), a sound that is low in pitch, relative to what the human ear can register, but is at the high end of the frequencies a tire generates. Think of the deep ping of a bouncing basketball. "You hear it if the tire goes over an expansion joint," says Scott Pajtas, technical sales director of Michelin. "It can also be a constant tone if there's a road-surface irregularity or a uniformity irregularity in the tire."

We put the technology to the test with two sets of Continental ContiSportContact 5 tires delivered from Tire Rack. The tires were identical save for the ContiSilent label etched into the sidewall and the polyurethane insulation glued to the insides of one set. We

AVERAGE SOUND LEVEL

	INSULATED TIRES	STANDARD TIRES
Concrete with expansion joints, 70 mph	69 dBA	70 dBA
Concrete with expansion joints, 45 mph	64 dBA	64 dBA
Smooth asphalt, 70 mph	64 dBA	64 dBA
Smooth asphalt, 45 mph	58 dBA	57 dBA



mounted them on a Tesla Model S, both to minimize the influence of powertrain noise and because the insulated version is a factory fitment on the Tesla.

For our first test, we averaged the cabin sound level over 15-second samples, driving on both a freshly paved, perfectly smooth asphalt road and an older, coarser concrete road with expansion joints, taking data at both 45 and 70 mph. In all conditions, the insulated tires had a negligible effect on the overall loudness.

Subtle differences did appear when we recorded laps on the ride road of Fiat Chrysler's Chelsea, Michigan, proving grounds. As the chart above shows, the insulated tires performed better through the first half of the 4.3-mile loop. Over various imperfect surfaces—including expansion joints, rumble strips, and sine-wave ripples in the pavement that repeat at increasingly greater frequency—there's a small but noticeable difference in overall loudness. However, we saw a more pronounced difference when looking specifically at the one-third-octave band centered on 200 Hz, which covers frequencies from 178 to 224 Hz. Even if the overall loudness hasn't dropped much, it indicates that the tone of the sound has changed.

That advantage narrows in the second half of the ride road, which includes more features you would expect to encounter in the real world. Several stretches are replicas of actual Michigan roads with lumpy, cracked, and pocked asphalt. Other sections include concrete slabs with slight vertical offsets—a condition that seems tailor-made for these tires—and yet there's only a marginal difference between the two sets.

If the effect appears small by our sound-meter measurements, it seemed even smaller when measured with our eardrums. We struggled to discern any significant improvement, although it probably didn't help that our back-to-back drives were separated by a half-hour tire swap. If you really strain to hear it—squint hard, cock your head, and clench your teeth—you just might notice the slight change in the tone of tire impacts. But if you can't tolerate the uneven drumming of tires, your best option is still drowning it out with The Who.



HONDA AND THE CHAMBERS OF SILENCE

Chasing the same 200-Hz tire-impact noise as tiremakers, Honda engineers developed injection-molded plastic chambers that wrap around the barrel of the Acura RLX's wheels. They are tuned so that sound waves reflecting in the tire cavity cancel out the undesired frequencies. Mounting the noise-canceling device to the wheel, rather than the tire, presents a particular challenge. The same centrifugal force that presses acoustic insulation against the tire liner pulls the plastic chambers away from the wheel. At 186 mph, the forces can be as great as 1500 g's. Honda's solution involves minimizing the weight and maximizing the rigidity of the resonators, which are then press fit under metal ridges cast into the wheel. —ET



NEW PERSPECTIVE ON THE ROAD



BY LUCIA BOZZOLA

Nothing beats hitting a stretch of gorgeous open road, especially when you live in a city like Los Angeles, where traffic is always jammed. And when you're riding in a car that loves to be driven, that experience is instantly enhanced. So, on an early summer morning, I pack up and head to the mountains.

"THE SWEET SENSATION OF MOTION AND THE ALPINE VISTAS THROUGH THE WINDSHIELD ARE A DRIVER'S VERSION OF NIRVANA."

The pavement's all mine at this hour. Tapping the responsive brakes and letting the car's available 8-speed automatic smoothly downshift itself, I tuck into the sharp turns. As I drive around the curve and see what's ahead, the sweet sensation of motion and the alpine vistas through the windshield are a driver's version of nirvana. I pull safely over as the sun starts to creep over the jagged horizon, casting diffuse light on the quiet, craggy slopes jutting above the low haze. All I can think is: Am I really less than 20 miles from the skyscrapers downtown?

TURN FOR MORE >

FRENCH PRESS

CAN PEUGEOT AND CITROËN REALLY MAKE IT BACK TO AMERICA?

by John Pearley Huffman

EARLIER THIS YEAR, CARLOS Tavares, CEO of France's PSA Group, announced his intention to resurrect the Peugeot and Citroën brands in the United States. This may only be proof that he is completely nuts.

"We need to expand to protect the company from any one regional crisis," Tavares told the *Financial Times*. In 2014, PSA took a \$3.3 billion (€3 billion) survival bailout from the French government and the Chinese state-run carmaker Dongfeng (each got 14 percent of the company). That's atop previous near-death experiences in 2009 and 2012 and, well, a rocky history dating back to when Peugeot took over bankrupt Citroën to create PSA in 1976.

Tavares's Trojan horse for North America is built on PSA's Mu and Multicity rental and car-sharing businesses. The idea is to establish fleets here over the next 10 years and eventually fill them with Citroëns and Peugeots. Then, *voilà* (that's French), it's an easy move into retail with reestablished brands. How PSA's plan will fare in a country practically overrun with startups already trying to topple Uber and Lyft is open to speculation.

But if Pokémon can scream back to prominence, dismissing Peugeot and Citroën may be foolhardy. "That's the nice thing about the United States market," explains Robert Kozinets, a marketing professor at the University of Southern California's Marshall School of Business. "There's room for a lot of marginal brands. They have to find their niche and they can have moderate success."



▼ IN 10 YEARS, PSA'S PORTFOLIO IS LIKELY TO BE ALL NEW. BUT HERE ARE A COUPLE OF HIGHLIGHTS FROM THE CURRENT LINEUP:

001

Citroën e-Mehari

An open-top Jeep-like beach buggy, the e-Mehari proves that electric vehicles need not be grim in their virtuousness—or lavish indulgences like a Tesla.

002

Peugeot 208 GTi by Peugeot Sport

This hottish hatch uses a turbocharged 1.6-liter four rated at 205 horsepower to challenge (and, many say, beat) cars such as the Ford Fiesta ST.

When Citroën left the market in 1974, its only car was the Maserati-powered, wonderful-when-it-ran, semi-exotic SM coupe. In 1990, Peugeot's last full year in the States, it delivered just 4292 copies of its 405 and 505 sedans. "The question for Peugeot becomes: Do they tap into some wellspring of existing meaning that might still be there?" wonders Kozinets. "The fact that they're still going strong in Europe has to mean something." Citroën's challenge, on the other hand, is to disinter from their graves the few SM buyers and other beatniks who bought DSs and Deux Chevaux.

The culturally resonant Chevrolet Camaro, Dodge Challenger, and VW Beetle have all made successful comebacks, but the only recent brand to attempt one is Fiat. Relaunched in 2011, it saw sales peak at 46,121 units in 2014 and then tank even as the market roared. PSA is the second-largest carmaker in Europe and ninth-biggest in the world. Tavares has led the company brilliantly. He isn't nuts. But bringing French cars back to America will be *très dur*.

PEUGEOT PEAKS



1974 504 Diesel

It made just 65 horsepower and needed 19.5 seconds to hit 60 mph. But in the fuel-crisis '70s, we loved it.

1985 505 Turbo

With a 142-hp 2.2-liter four, it was a viable BMW 3-series alternative for people who liked buttery croissants.

PEUGEOT VALLEYS



1977 604

This big, sort-of-sumptuous, squishy-riding sedan was supposed to challenge Mercedes. It didn't.

1989 405

A tidy and pleasant front-driver, it was meant to save Peugeot in America. Its failure sealed the brand's fate.

CITROËN PEAKS



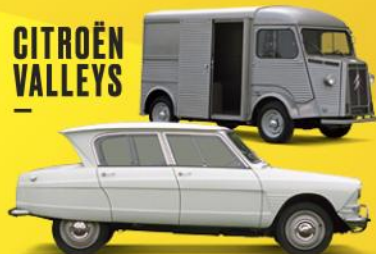
1949 2CV

It resembled a snail, and its 375-cc flat-two was rated at 9 horsepower. But it mobilized a nation the same way the Ford Model T and the original VW Beetle did.

1955 DS19

Utterly revolutionary in virtually every way, the DS series is the greatest French car of all time. The world still hasn't caught up.

CITROËN VALLEYS



1947 H-Van

It looked like a corrugated-steel outhouse shambling down the road. What's wrong is that Citroën never officially exported it to the U.S.

1960 Ami

Built to replace the irreplaceable 2CV, it gets prettier with each sip of Armagnac.

NEW PERSPECTIVE

ON THE ALL-NEW 2016 CHEVY MALIBU

The confident, energetic 2016 Malibu shines on the mountain roads. The available 2.0 liter turbo under the hood provides ample power while keeping the car light and agile. With tight steering and responsive brakes, I am able to nimbly dodge a few rocks in the next turn without missing a beat. A flat tire is definitely not on the agenda.

The Malibu's advanced engineering continues to exhilarate as the altitude rises. The available engine's 250 horses make the ascent through the San Gabriel Mountains so graceful that it's only my popping ears that remind me I'm 7,000 feet above sea level. From this height, I can see the empty road ahead winding its way through the tall pines, and the mist settled among the lower peaks.

The external lines and the sleek available 19-inch aluminum wheels announce the Malibu as a clean, refined mid-size sedan that commands the road by speaking softly. That attention to design detail carries over inside, with comfy and available features like the leather-wrapped steering wheel, well-placed controls and easy-to-use infotainment touch screen. Even the key fob feels nice in my hand.

**“A CLEAN, REFINED
MID-SIZE SEDAN THAT
COMMANDS THE ROAD
BY SPEAKING SOFTLY.”**

When I leave Angeles National Forest, the Malibu handles the highway speeds and traffic as effortlessly as the twists and climbs. I'm not ready to go back home, so I head toward the skyscrapers instead. Cars, trucks and pedestrians jockey for position on the downtown streets, but the Malibu does its part to make sure nothing ruins a great day. I pull over and fire up Apple CarPlay¹ on the Malibu's available Chevrolet MyLink² display to find my favorite coffee spot. Even though the Malibu doesn't need to refuel yet, I do.

Time to roll after the pit stop. With the available sunroof and windows closed, and the A/C maintaining its cool, the city noise is put on mute. It's as peaceful as the mountain passes inside the Malibu, and I'm already craving the next drive.

¹ Vehicle user interface is a product of Apple, and its terms and privacy statements apply. Requires compatible smartphone, and data plan rates apply. Apple CarPlay is a trademark of Apple Inc. iPhone is a trademark of Apple Inc., registered in the U.S. and other countries. ² MyLink functionality varies by model. Full functionality requires compatible Bluetooth and smartphone, and USB connectivity for some devices.



PLAYING THE FUEL

WHY MANUFACTURERS KEEP CORRECTING THEIR FUEL-ECONOMY ESTIMATES. *by Alexander Stoklosa*

RECENT CASES OF “MISSTATED” fuel economy involving Ford, GM, Hyundai, and Mercedes-Benz have this in common: All were caught by the EPA during audits of data submitted by the manufacturers for certification. That’s because the EPA—lacking the personnel, facilities, and funding to test every vehicle—lets the manufacturers largely certify themselves and just submit the data.

All automakers follow the same set of procedures designed to generate comparable mpg numbers, but manufacturers have obvious incentive to exploit gray areas and loopholes to produce higher ratings. The goal is to net the best window-sticker numbers without netting ones so good that they raise suspicions. It’s a delicate dance, and engineers we spoke with described it as pervasive. These are a few manufacturer approaches:

▼ IT’S A DRAG

The EPA-prescribed dynamometer tests incorporate calibration settings intended to align laboratory results with real-world performance. Road-load coefficients—determined from a coast-down test wherein a car coasts in neutral from 80 mph—are programmed into the dyno to account for the energy lost to aerodynamic drag and friction. Recently, the EPA had to remind automakers to test cars on typical road surfaces and with critical components such as brake pads in place—their removal lowers friction. The EPA also warned against “adjustments,” such as special alignments or using extra-worn parts. Mitsubishi is currently being investigated for manipulating coast-down data, and Hyundai had to lower the ratings of 1.2 million cars in 2014 after it cherry-picked favorable figures instead of using averaged data.

▼ BODY SWAP

In 2013, Ford used a legal EPA provision allowing cars of similar weight and with the same powertrain to share ratings, assigning the C-Max hybrid the same 47-mpg combined figure as the Fusion hybrid. Customer backlash and an EPA audit revealed

real-world C-Max fuel economy to be far lower, however, prompting Ford’s “voluntary” reduction of the hybrid wagon’s rating. For a time, Toyota used the same clause, without issue, to apply the Camry’s fuel-economy rating to the larger Avalon.

▼ POPULARITY CONTEST

Per EPA rules, only the expected sales leader within a model family sharing a powertrain must be tested. This explains why, out of the four available trim levels on the 2016 Chevrolet Cruze—two with multiple transmission choices—only the automatic LS has a smaller, 12.1-gallon fuel tank. A smaller tank means less weight. GM used this lighter LS model to generate the 30-mpg city/42-mpg highway ratings for multiple automatic Cruzes, a group that includes the better-equipped LT that rides on wider 16-inch wheels, fills the LS’s empty trunk well with a spare tire, and sits in a higher EPA test-weight class. Legally, Chevrolet could apply the *superleggera* LS’s ratings to the heavier, range-topping Premier, too, but it tested that one separately and rated it at a lower 30 mpg city/40 highway.

We’ll likely see more such caution. The EPA issued a memo last year promising to increase audits of reported data and to test more cars itself. The message is clear: Generate reproducible test results or prepare to make adjustments—and headlines.

HOT 'N' COLD

The EPA uses dyno cells like this for tests from 20-degree cold starts to 86-degree highway runs. A separate cell with high-intensity lights simulates the solar load of a sunny day for the high-temp tests.



THE FULL PERSPECTIVE

ENTHUSIASTS CAN FEEL CONFIDENT RECOMMENDING THE ALL-NEW 2016 CHEVY MALIBU. HERE'S WHY:



The all-new 2016 Malibu is a lot more than a handsome face. It has engine options for all tastes, from the impressive efficiency of the 1.5 L 153 hp base model to the eco-minded Malibu Hybrid with an EPA-estimated 48 MPG in the city¹. Even the available 250 hp 2.0 L turbo delivers up to an EPA-estimated 33 MPG on the highway¹, so you don't have to sacrifice tons of gas dollars or travel distance for more power.

The Malibu leverages its high technology for enhanced safety. Available active safety technologies like Low Speed Front Automatic Braking and Lane Keep Assist work to help you prevent collisions before they happen. (Safety features are no substitute for driver's responsibility to operate the vehicle in a safe manner. The driver should remain attentive to traffic, surroundings and road conditions at all times. Read the vehicle's owner's manual for more important safety information.)

Technology isn't just for the driver in the all-new Malibu. With capacity for up to seven devices, the available built-in 4G LTE Wi-fi² means never having to hear "are we there yet?" again. And with the available Chevrolet MyLink display with support for Apple CarPlay[™] and Android Auto,^{™3} you'll have no problem finding plenty of places to go, whether you have company or you're just out for another spectacular drive.



**"THE NEWLY
DESIGNED
2016 MALIBU
IS A LOT
MORE THAN
A HANDSOME
FACE."**



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MALIBU

¹EPA-estimated MPG city/highway 27/37 on 1.5L and 47/46 on Malibu Hybrid. ²Requires a compatible mobile device, active OnStar service, and data plan. 4G LTE service available in select markets. Visit onstar.com for coverage map, details and system limitations. ³Vehicle user interfaces are products of Apple and Google, and their terms and privacy statements apply. Requires compatible smartphone, and data plan rates apply. Apple CarPlay is a trademark of Apple Inc. iPhone is a trademark of Apple Inc., registered in the U.S. and other countries. Android Auto is a trademark of Google Inc.

My wife and I drove C/D's long-term Kia Sorento to Livingston, Montana, to share drinks with novelist/gourmand/raconteur Jim Harrison. Jim lives south of town in the aptly named Paradise Valley. I first met him through

meals shared with David E. Davis Jr., where Jim would occasionally burst into Tourette-quality profanity during the dinner prayer and where his evening attire comprised a terry-cloth bathrobe, skin underneath.

Jim always seemed to live by celebrities—Tom McGuane, Michael Keaton, John Mayer, Russell Chatham—and the neon-speckled trout in the Yellowstone River, which I believe he preferred to people. I'd think of Paradise Valley as a kind of bohemian retreat if bohemians all carried loaded weapons.

In Livingston, it's my habit to stay at the Murray Hotel, circa 1904—motto: "Fireproof and strictly modern." It was originally a four-story "skyscraper" with the town's only elevator, an Otis hand-cranked model. In the late '70s and early '80s, director Sam Peckinpah resided on the Murray's top floor, in the shadow of the Absaroka and Crazy mountains, true purple mountain majesties. Speaking of crazy, he attached a sign to

his door that read, "The old iguana sleeps, and the answer is still no." When Peckinpah became so drunk he couldn't find the door, he'd shoot holes in the ceiling.

Anyway. Attached to the hotel is the Murray Bar—live music, dogs welcome, trout fisherman galore, among them occasionally Anthony Bourdain and often Jim, who once told his waitress, "I was a dog with a short chain, and now there's no chain." Stricken by ill health the last few years, Jim prophetically mentioned, "At my age, you don't think about the future because you don't have one."

Which was true. Between the time we set up our tentative drinking date and our arrival at the Murray, Jim died. The official cause of death, in Livingston at least, is "Body all wore out." Toward the end, Jim looked like Ernest Hemingway if Hemingway had been dragged for a couple of miles behind a train. I say that knowing it would make Jim smile, although I think he detested Hemingway. Anyway, this is the first time I've kept an appointment with a dead man. And the last, I hope.

My wife and I walked over to the local bookstore, where the elderly manager occasionally rushes outside to yell at skateboarders. I bought Jim's final book, and the store lady said, "He'd have signed that, but he got cranky at the end, suffering so much from shingles that he'd walk up to perfect

strangers and say, 'If you don't have your shingles immunization, I'll buy it for you.'" She further claimed that when Jim died, he dropped the writing pen he was holding. I insisted it was more likely he dropped the American Spirit cigarette in his left hand and the jelly jar of Domaine Tempier Bandon in his right. "He had three hands?" she asked. Jim abandoned the Murray Bar after no-smoking signs were posted but quickly located a downscale establishment where smoking was apparently mandatory. You could tell when he was in residence, I'm told, if his "dream car"—a Toyota Land Cruiser—was parked at a bad angle and half atop the curb. Jim had poor aim, but it was because his left eye had been jabbed out when he was a kid. Last time I talked to Jim, he asked about my own dream car. "A 1967 Bizzarrini 5300 GT Strada," I answered. Jim pondered that, then blew a small cloud of smoke in my face. I recall two long-term Subarus that Jim borrowed. Both returned looking as if a 50-pound ashtay had exploded inside a Burger King dumpster.

The next morning in Livingston, the Sorento's right-rear Kumho was flat—well, not completely, but the bottom of the tire was rumpled like scrambled eggs. I'll bet half of all my flats have been discovered in the morning, after a slow leak did its dirty work during the graveyard shift. The tire was in the gutter, hard against the curb. Worse, behind me were breakfast diners sitting at sidewalk tables, offering the amount of advice you'd level at a fourth-grade golfer. They were unanimously appalled when I loosened the lug nuts before raising the car, perhaps thinking I was going to attempt a jack-free fix. Then a bald guy shouted, "Wait, *there's* your problem," as he pointed to the Sorento's California license plate. I got a small round of applause at the conclusion, although what I never got was an offer of assistance.

If Jim Harrison had something like a mantra, it was this: "My mom and dad preferred the straight and narrow, where I, for nongenetic reasons, have favored the wide and crooked." More advice, only this time worthwhile. ■



MR. HARRISON AT WORK. YOUR C/D COLUMNIST IS DEVELOPING SIMILAR FACIAL FEATURES.

John Phillips

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If anyone has perspective on Le Mans, it's Porsche. The *rennwagens* from Zuffenhausen have made the trek to the ancient seat of the Plantagenet kings for so long that when they installed the Porsche Curves to slow down the

track between Arnage and Maison Blanche in 1972, Porsche could already claim 21 years of history at the circuit. No brand has won overall more times—18 after this year's bizarre last-lap croak of the leading Toyota—or can boast more consecutive victories. At breakfast before this year's running, three-time winner Hurley Haywood recounted how he got lost on his first trip in 1977 and slept in his rental car in the parking lot below the Gothic majesty of the Cathédrale Saint-Julien as the Porsche team searched frantically for him. Just one of a million stories.

So it was stunning when current Porsche GT racing boss Frank-Steffen Walliser nearly broke down in the Friday press conference this year, vowing to fight last-second Balance of Performance changes that seemed to disadvantage the Porsche 911s. Sixty-five years of loyalty, it seemed, were being trampled in favor of the sexy new thing from Dearborn, the Ford GT, which, along with the Ferrari 488, was suddenly running well above the pace after post-testing rule changes. Was the Automobile Club de l'Ouest trying in its *jam-bon*-handed way to engineer a repeat of the 1966 Ford-versus-Ferrari battle? Speculating on the ulterior motives of the French stewards is its own sport at Le Mans. And, after the Fords and Ferraris outpaced everyone in GTE Pro for 24 hours to a split-

hair finish, Ford taking the historically symmetrical win, it certainly looked fishy.

Balance of Performance is what they call the convoluted effort to equalize the speeds of dissimilar cars in the same class, especially the production-based GT classes. A diverse menagerie of exotic door-slammer fighting fang-and-talon to the finish is the goal. BoP, ideally, should make it happen by encouraging automakers to bring whatever hot production car they've got, from the Porsche 911 to the Aston Martin Vantage to the Chevy Corvette to the Ford GT, and providing a decent chance of winning. Get BoP right through constant weight, restrictor size, and boost adjustments, and more automakers will be tempted to develop cars and jump in, which can only be healthy for the sport and for sports-car buyers.

However, in the world's most famous 24-hour race, even the tiniest advantages can work magic. Add in the factor of teams knowing how to game the system by, say, sandbagging the car in the test sessions to thereby score favorable changes from the rulemakers, and controversy flourishes like mold on month-old *fromage*. Writer Marshall Pruett spent many hours at Circuit de la Sarthe this year covering the BoP fracas. His take? "Through ineptitude and artful manipulation by the teams," he told me, "a small group of technical sheriffs whom

nobody knows were given the power to make a great race or screw things up completely." Pruett doesn't see nefarious schemes; he sees an inexperienced committee using outdated methods to try to control a mob of sophisticated cheats. And, as the saying goes, there are only two kinds of racers: cheaters and losers. Pruett also sees, lamentably, a sport that has been turned over to the referees. Racing's decline, in his eyes, goes hand in Nomex glove with the latter-day swelling of the rulebook and the despotism of the stewards. As Pruett points out, they don't add extra shoes to weigh down bigger horses at the Kentucky Derby or make LeBron James play in moon boots. Outcomes shaped by rules and referees are a disease on sport.

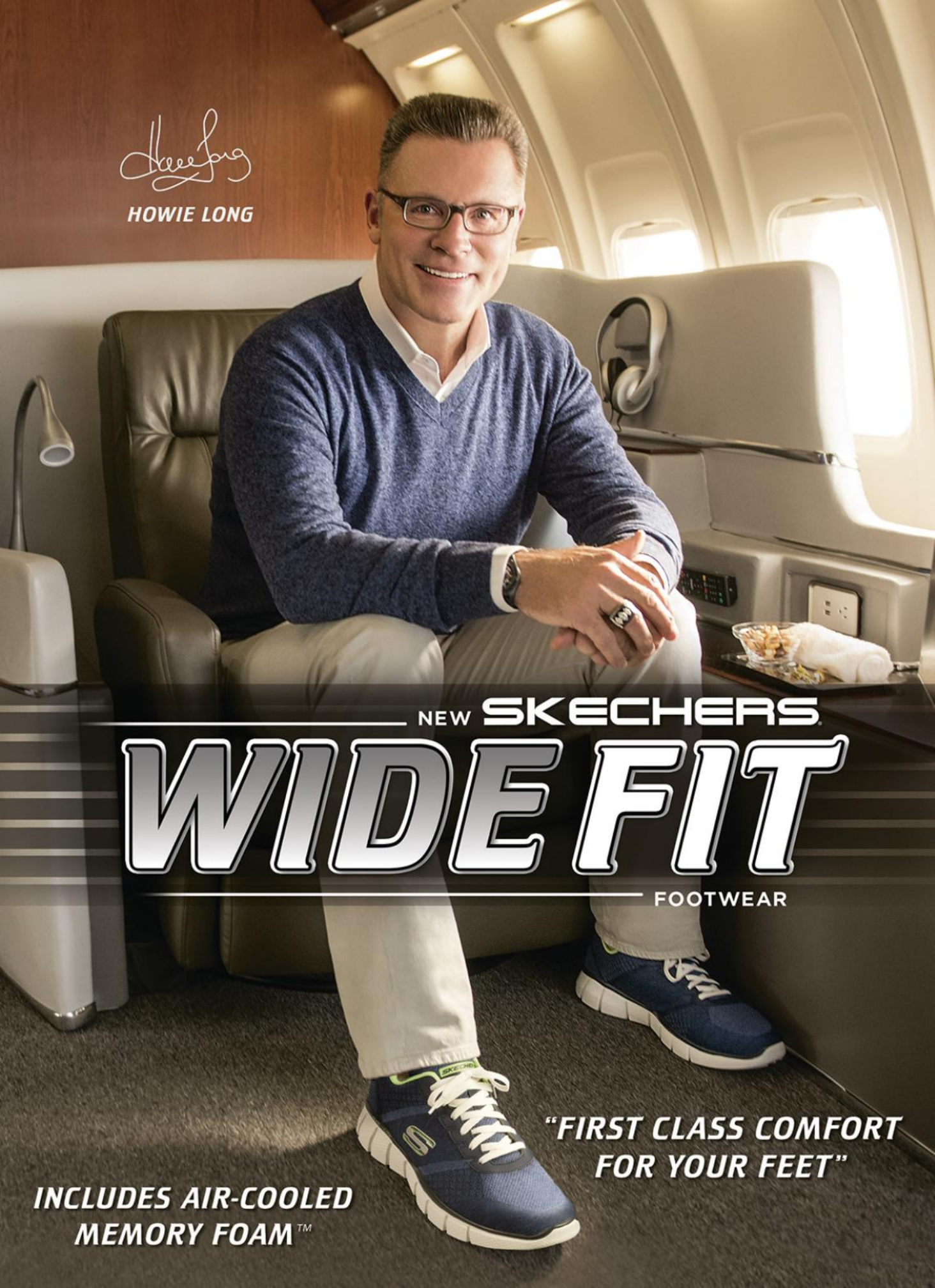
Fixing what ails racing raises the question of exactly why we are drawn to it. Is it the sleek cars, the absurd speeds, or the close competition? NASCAR has the bunched-up fields, but the cars are dull clones. Le Mans has the car variety but infighting over how to manage it. Drop all rules and it's an arms race, an upward cost and speed spiral that will lead to casualties, haves and have-nots, and series implosion.

I'm not even convinced you can "fix" racing. No matter how perfect the formula, it will never have what most ball sports and some newfangled youth interests such as drone racing and eSports gaming offer: low barriers to audience participation. Kids can play ball sports in leagues or the backyard or play Dota 2, the online game for which last year's international championship in Seattle paid an \$18.4 million purse. As the do-it-all-socially, GoPro generation comes of age, auto racing stands apart as our most passive of pro sports. It is something to watch but, for most of us, never to do.

Alas, Le Mans this year was a corker. Sure, BoP played a role, but not as much as racecraft. Maybe Ford wrote a big check, maybe it got a rule break, but Le Mans is still an incredibly difficult thing to win, as a wander through the pits at 4:00 a.m. proves. BoP merely set the stage; the teams had to perform. People doing amazing things with machines; that's why we come. 🇫🇷



Aaron Robinson

A man with glasses and a blue sweater sits in a leather chair inside a private jet. He is smiling and has his hands clasped. The background shows the interior of the aircraft with windows and overhead storage bins.

Howie Long

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The rent is too damn high. And by rent, I mean car prices. I'm given to the occasional gasp when I see a new car's window sticker, but the last time I drove a Cadillac Escalade, I looked at the price and went into a fugue for days.

I saw a number starting with a “9,” and I don’t remember anything until I woke with the room spinning and a doctor begging me to stop yelling, “It’s a Silverado with seats in the bed!” He was a good doctor. He told me, “Son, a Silverado can go 65 grand anyway, so settle down.” That made me feel better, I guess. But the question remains: Are car prices just going bonkers, or what?

Two years ago I got an email from Bankrate.com touting a study called “New Cars Unaffordable in All But One Major Metro Area.” It claimed that of the 25 largest metropolitan areas in the U.S., Washington, D.C., was the only one where a median-income family could afford to buy the average new car. (And by “afford” it meant putting down 20 percent and not financing it through the end of the Holocene Epoch.) I ignored this disturbing revelation because I ignore most of my emails, which are usually tagged with boring subjects like “Urgent story deadline” and “Report to HR to discuss your attire.” Delete! If somebody doesn’t like my vintage 1980s basketball shorts, they can tell me to my face at the cafeteria salad bar.

Anyway, Bankrate recently announced a follow-up study entitled “New Cars Are Unaffordable in All Major U.S. Cities.” This time it went 50 cities deep. In none of them could the median-income resident reasonably afford to spend \$33,865, the current

average price of a new car or light truck. You could say that’s an indictment of the urban cost-of-living index, and you might be right. But let’s look at car prices themselves, as viewed through the economically precise prism of random window stickers that I’ve happened to save over the years.



The oldest Monroney in my stack belongs to a 2004 BMW 545i that I drove to the Canadian Grand Prix. I can’t remember anyone’s birthday or my kids’ names, but I can remember barreling down a glorious I-93 on-ramp more than 12 years ago in that gray BMW. It had a manual trans-

mission, sport package, and premium sound but was otherwise light on the options. Total price: \$62,660. Simply adjusting for inflation, that 545i would now cost \$79,954. So I go to BMW’s website and build a 2016 550i with the same options—no manual trans is offered, though—to find out just how much the price has blown past the rate of inflation. With the sport package, premium sound, and power rear sunshade (it still costs \$575, just as it did in 2004), a 550i arrives at a total price of . . . \$74,820. So the 5-series actually got cheaper, relative to everything else? This does not jibe with my keenly felt impression regarding the rent and its highness.

Other pleasant surprises: Back in 2008, I drove a Volkswagen R32 that cost \$35,430. A similarly equipped 2016 Golf R with navi-

gation and DSG goes for \$39,815. Which is almost exactly the inflation-adjusted price of the R32, but for a much faster, better-handling car that doesn’t sound like Chewbacca. Volkswagen would probably like to charge a little more for the flagship Golf, but the arrival of the Audi S3 means that it can’t, out of respect for brand boundaries. So thanks for the bargain Golf, Audi.

In at least one case, a price just straight-up dropped, even without factoring in inflation. My Monroney for the most expensive 2007 Subaru Legacy, the 2.5GT spec.B, carries a price of \$34,620. The current top-dog Legacy, the 3.6R, costs only \$32,460. Sure, this isn’t a totally apples-to-inverted-Bilsteins comparison, but it demonstrates Subie’s commitment to a lean MSRP. Subaru’s unstoppable growth in recent years probably has at least a little bit to do with the fact that every one of its models still seems reasonably priced. It’s easy to spend 50 grand on a car, but there is still no such thing as a \$50,000 Subaru.

Cars are looking okay then, based on my admittedly scattershot sample. Trucks and SUVs are another matter. Six years ago, I drove a Ram 3500 Cummins dualie that cost \$35,855. Inflation suggests that this truck should now cost a little less than \$40,000. Nope. Buying a similar 2016 model now requires \$48,435.

In 2008, I drove a Porsche Cayenne that carried a base price of \$44,295. Nowadays a Cayenne starts at \$60,650, meaning that the Porsche’s price increases outpaced inflation by a factor of more than three. And then there’s the Escalade. In 2008 I drove a fully maxed-out 4x4 hybrid that ran \$75,330. Now a totally slathered ’Slade goes for more than \$94,000. And it’s not a hybrid. I mean, the Escalade’s a baller and all, but I fear GM is in danger of overfishing this particular sea of profit.

I’m not an economist, but I vaguely grasp the idea of supply and demand. And it would seem that trucks are in demand and priced accordingly, and cars are kind of a bargain, and cities are real expensive places to live. The rent is, in fact, too damn high. But a Subaru WRX is still a pretty nice deal.

Ezra Dyer

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LIGHTNING LAP NO.10

Every year for a decade now, we've fried tires—and occasionally our nerves—on America's most demanding road course, **Virginia International Raceway**, to answer the ultimate performance-car question: What'll it do? The track doesn't care about marketing claims or badge snobbery; it treats every entrant equally harshly. This year we threw 18 cars (plus a few oddballs) into VIR's paved crucible. Here, then, is what they did.

*by K.C. Colwell, Josh Jacquot,
Tony Quiroga, Aaron Robinson,
and Eric Tingwall
photography by Marc Urbano*



illustrations by Bryan Christie Design

LIGHTNING LAP NO.10

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LIGHTNING LAP NO.10

P/034 . CAR AND DRIVER . OCT/2016

ON THE FOLLOWING PAGES: The fastest, stickiest, lightest, and all-around most jaw-dropping performances from our five production-car classes in a decade's worth of Lightning Laps.

And just like that, a decade is gone. It's been 10 years since our first Lightning Lap, 10 years since we endeavored to create a North American answer to the benchmark Nürburgring Nordschleife, where automakers take their fastest to joust for lap-time supremacy. It's possible that Virginia International Raceway's 4.1-mile Grand West Course will someday be displaced as the longest world-class road course in the U.S., being just a hair longer than Road America and just a smidge shorter than Belgium's Circuit de Spa-Francorchamps, but we're here to stay. Ten years of data generated by 201 cars is the best kind of boat anchor, the long cable of comparative results keeping us tethered to this magnificent track for as long as people are interested in how fast the fastest new cars can go.

Our 2016 lineup has stark similarities to the one from November 2006. We had a Ford Mustang Shelby GT500 then; we have the new Shelby GT350R now. We had a Chevy Corvette and a Z06 then; we have the freshly unwrapped Corvette Grand Sport this year. Back then, we had a BMW M6, a Dodge Charger SRT8 and Viper SRT10, and a Porsche Cayman S; this year we have the M2 and M4 GTS, a Charger SRT Hellcat and a new Viper ACR, and a Cayman GT4. The cars may be getting faster—the quickest one then, 3:00.7; this year, 2:44.2—but the brands that invest in performance have been remarkably consistent, because the people in charge of them know that 90 percent of establishing a bankable legacy is just showing up.

And show up they did, with 21 cars including a couple of track-only specials, which are not official LL1–LL5 class cars, and our own long-term 2015 Tesla Model S P85D because



VMAX, THE FASTEST RECORDED SPEEDS ON TRACK, MPH: 2015 Porsche 918 Spyder, **170.6** • 2016 McLaren 570S, **162.8** • 2015 McLaren 650S Spider, **162.8** • 2016 Ferrari 488GTB, **161.7** • 2012 Mosler Photon, **161.1** • 2010 Lamborghini Gallardo LP570-4 Superleggera, **159.2** • 2012 Ferrari 458 Italia, **158.0** • 2010 Lamborghini Murciélago LP670-4 SV, **157.5** • 2014 Ferrari F12berlinetta, **157.4** • 2009 Chevrolet Corvette ZR1, **157.4**

you, the readers, wanted to know how the big electric would do. Our usual assortment of classes ranges from LL1, for cars with sub-\$35,000 base prices, up to LL5, for \$245,000 and above. As a reminder, all the base prices you see on the following 19 pages include performance-enhancing options, such as carbon-ceramic brake rotors, light-weight components, performance tires, and even high-bolstered thrones.

This year we tweak convention slightly by sequencing the cars here in finishing order, regardless of class. That's simply to create a more logical progression through the story, from slowest to quickest. Otherwise, our three-day lap-a-thon in the warm but blessedly dry days of early June went by the procedural book, with only a few harmless spins and some grass-cutting excursions but nary a chipped splitter.

Armed with Racelogic VBox GPS data loggers in each car to record the copious data, the quintet of editors who drove for time were left to their own instincts (and advice from attending engineers, in some cases) as to how best to extract the quickest laps. As usual, morning was the golden hour, when the cold track and cool, dense air could work their magic on grip and power. Even so, experience proves that every bit of the three days is needed to whittle down the lap times to data and impressions we can stand behind. So without further ado, here they are.

2016 AUDI TTS (LL2)

3:07.7

BASE PRICE: \$52,825

AS-TESTED PRICE: \$57,525

292 HP • 3223 LB • 11.0 LB/HP

TIRES: PIRELLI P ZERO, 255/30R-20 (92Y)

The TTS's 3:07.7 run marks the quickest we've ever hustled Volkswagen's versatile Modularer Querbaukasten (MQB) platform around Grand West. That was expected. We weren't, however, expecting the margin to be quite so large. The TTS lops 3.6 seconds from the lap time of last year's S3, a car that uses the same 292-hp turbocharged four-cylinder, six-speed dual-clutch transmission, and all-wheel-drive system.

The TTS's advantages are few but meaningful. It runs on stickier Pirelli P Zero tires with a 255 section width compared with the S3's 235-section Continental ContiSportContact 5P rubber. And it keeps those tires in contact with the pavement with magnetorheological dampers, which are bolted to a car that weighs 223 pounds less than the S3 sedan thanks to more aluminum in its unibody.

As the least powerful car in this year's event, though, the TTS serves as the caboose through three of our five sectors. It claws ahead in the pack only through the infield, where a quick time is made by maintaining speed through linked bends rather

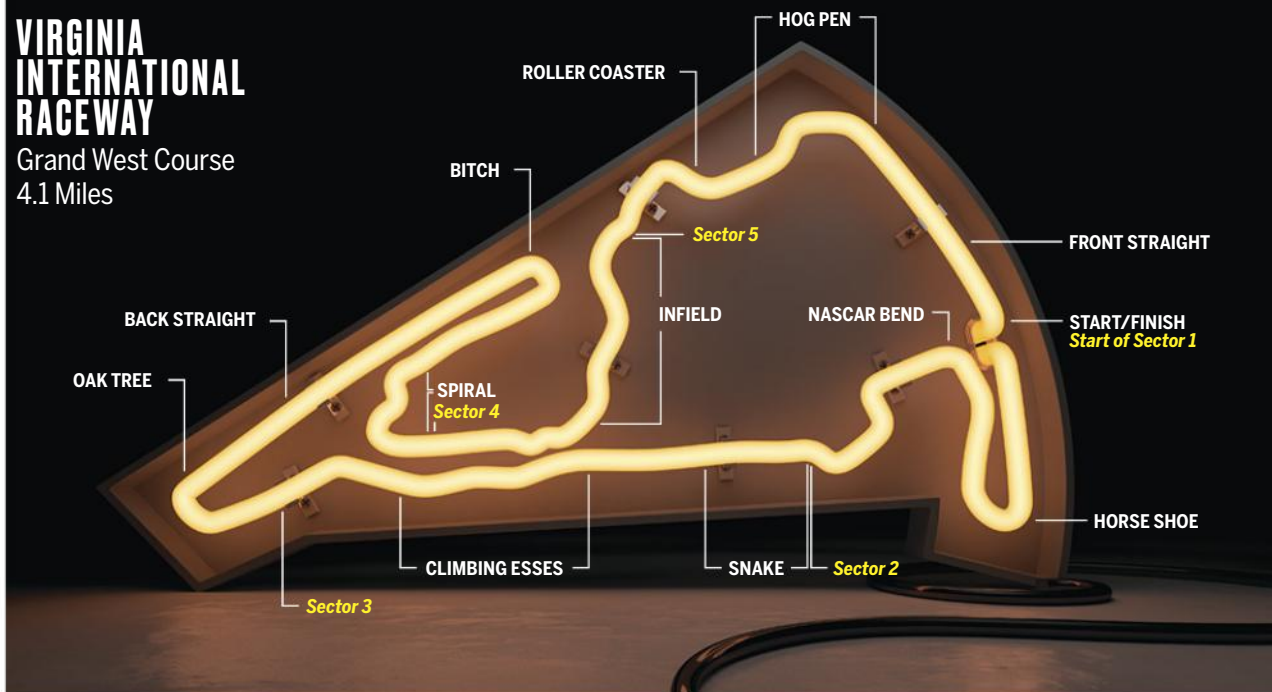


than accelerating out of corners. There, the TTS outran three larger, heavier, and less precise-handling cars that couldn't be helped by prodigious power: the Dodge Charger SRT Hellcat, the Jaguar F-type Project 7, and the Lexus GS F.

Like its MQB-platform cousins, the TTS is so stable as to be slightly aloof. The Ford Focus RS shares several fundamental similarities with the TTS's layout, and yet driving the two back to back is the difference between playing tackle football and pinocle. The raucous Ford invites the

VIRGINIA INTERNATIONAL RACEWAY

Grand West Course
4.1 Miles



LIGHTNING LAP NO.10

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CLASS BOUNDARIES: LL1 (UP TO \$34,999)
LL2 (\$35,000-\$64,999) • LL3 (\$65,000-\$124,999)
LL4 (\$125,000-\$244,999) • LL5 (\$245,000 AND ABOVE)



driver to hammer the throttle and balance the chassis in a subtle, tightly controlled drift. The buttoned-up Audi demands clean driving and never threatens to so much as wiggle its butt. It delivers more front-end grip than an S3, a VW GTI or a Golf R, yet it still requires a steady hand and a patient right foot to keep understeer at a distance. Frankly, the TTS is too unflappable to teach the nuances of car control, but its predictability makes it the perfect set of training wheels for track virgins.

2016 LEXUS GS F (LL3) 3:05.9

BASE PRICE: \$85,390

AS-TESTED PRICE: \$86,770

467 HP • 4132 LB • 8.8 LB/HP

TIRES: MICHELIN PILOT SUPER SPORT

F: 255/35ZR-19 (92Y), R: 275/35ZR-19 (96Y)

At speed, the 4132-pound Lexus GS F is a bear riding a bicycle. How does something so large perform with such grace? It's completely unnatural.

Of course, there's nothing natural about a torque-vectoring differential, which is precisely how the GS F achieves its agility. By varying the torque between the left- and right-rear wheels, the GS F allows the driver to counter any front-end push with a squeeze of the throttle. The result is forward thrust and added rotation at the same time, meaning a carefully metered right foot can adjust the car's trajectory through the corner without sacrificing speed. The GS F is a docile, approachable thing that

only rebukes ugly driving with benign, controllable slides, and it makes for an entertaining ride around Grand West.

True to stereotype, this Lexus rides softer than the average sports sedan. It runs over VIR's curbing with the indifference of an RX350 bumping into parking chocks at Costco, and it corners with considerable but controlled lean. The eight-speed automatic transmission refuses to break character, delivering paddle-shifted gearchanges fluidly albeit slowly, even with the mode selector dialed to sport-plus.

The GS F shares its powertrain and key structural components with the RC F coupe, shouldering a modest 63-pound penalty for its longer, taller body and two additional doors. The differences between

the two cars are subtle enough that the GS F is a mere 0.1 second slower through the 4.1-mile lap than the two-door.

The 467-hp V-8 has a righteous, brassy intake honk at full throttle and pulls assertively, even if it is down more than 100 horsepower to several boosted competitors. Lexus has maintained that its F cars are about the experience rather than outright speed. The GS F validates that philosophy. Though it may seem unintuitive, hustling this two-ton sedan around the track feels entirely natural.

2017 CHEVROLET CAMARO 1LE (LL1) 3:04.0

BASE PRICE: \$34,495

AS-TESTED PRICE: \$43,185

335 HP • 3516 LB • 10.5 LB/HP

TIRES: GOODYEAR EAGLE F1 ASYMMETRIC3

RUNONFLAT, F: 245/40ZR-20 95Y

R: 275/35ZR-20 98Y

The 2006 Nissan 350Z Track lasted nine Lightning Laps and withstood 38 challenges before its LL1 class-record 3:12.5 lap fell. A Ford Mustang V-6 matched the Nissan's time in 2011, but it's the Chevy pony car that finally dethrones them both. The Camaro V-6 1LE does not merely claim the fastest LL1 time in the 10-year existence of Lightning Lap, it blasts the old record with eight sticks of dynamite.

Coming within \$504 of the LL1 cap, the \$34,495 Camaro 1LE steals more than eight seconds from the previous LL1 record holders. In doing so, it leaves in its wake a



HIGHEST GRIP IN HORSE SHOE (TURN 1) ON RECORD, G: 2015 Chevy Corvette Z06, **1.20** • 2017 Chevy Corvette Grand Sport, **1.19** • 2009 Mosler MT900S, **1.16** • 2015 Chevy Camaro Z/28, **1.16** • 2015 Porsche 918, **1.16** • 2015 Nissan GT-R NISMO, **1.15** • 2016 Dodge Viper ACR, **1.15** • 2016 Porsche 911 GT3 RS, **1.14** • 2015 Lambo Huracán LP610-4, **1.13** • 2014 Ferrari F12, **1.11** • 2014 SRT Viper TA, **1.11** • 2017 Chevy Camaro SS 1LE, **1.11** • 2016 Ferrari 488, **1.11**



differential, and transmission coolers; a limited-slip differential; and a firmer suspension with rear toe-control links that trade bushings for stiffer ball joints.

The guttural 3.6-liter V-6—the same heavily revised engine as in all other six-cylinder Camaros—charges to 7000 rpm with a boisterous enthusiasm that’s seemingly been lost in all but the most exotic six-pot engines. It’s a fantastic engine, and also this car’s greatest short-coming. The chassis simply deserves more power. Chevy already has the fix: the Camaro SS 1LE [see page 044].

2016 FORD FOCUS RS (LL2)

3:03.9

BASE PRICE: \$38,765

AS-TESTED PRICE: \$42,245

350 HP • 3451 LB • 9.9 LB/HP

TIRES: MICHELIN PILOT SPORT CUP 2

235/35ZR-19 (91Y)

One-point-three seconds. That’s the delta between the \$42,245 Ford Focus RS and the \$42,975 Mustang GT we ran here last year. That it falls in favor of the Focus has something to do with the Mustang’s 371 additional pounds—a penalty not sufficiently offset by the latter’s 85 additional horsepower.

Unlike the Mustang, the RS’s development roots and spiritual successors lie in Europe and Japan, respectively. Yet there’s something distinctly American about the state of mind required to go quickly in the RS. The most effective driving style, the one that solves most problems, in fact, is gratuitous use of the throttle. Put your foot in it. Steer. Let the electronics sort out the rest. What could be more American than that?

And yet, to drive the RS properly is to disregard the familiar. Big initial steering inputs are rewarded with aggressive rotation. Once turned, its natural corner stance is often mildly tail-out. There are limits, of course. Even the Focus’s wildly lenient stability control can’t thwart the icy, indifferent hand of physics once speed and the momentum that accompanies it become too high. The RS’s torque-biasing all-wheel-drive system is a merciless merchant of sideways speed. But keep the slides sensible and the laps are faster than they would be with customarily clean driving.

The RS rewrites the rules about traditional track driving. It rewards flamboyance behind the wheel. And it flashes its

parade of more powerful and more expensive cars, and it absolutely stomps its current Blue Oval rival, the Mustang EcoBoost equipped with the Performance package. Were they on the track at the same time, the boosted Mustang would only be exiting Hog Pen onto the front straight as the Camaro crossed the start/finish line at 3:04. The Ford needs an additional 11.6 seconds to complete its lap. And it gets worse for Mustang acolytes: Despite a 100-hp deficit, the 1LE laps VIR faster than the eight-cylinder Mustang GT.

The first six-cylinder in the 28-year history of the 1LE badge, this Camaro offers far more grip than go. There’s so much stick and stability in corners that, through the spaghetti-noodle infield, the 1LE punches

above its 335-hp rating with a quicker time in sector four than the Jaguar F-type Project 7, the 10-cylinder Audi R8, and the 707-hp Dodge Charger SRT Hellcat, among others. At the limit, the Camaro defaults to a slight and manageable front-end push that makes the chassis feel imperturbable. Weighty steering places the front tires exactly where you will them.

LL1 competitors often demand frequent cool-down laps (and immense self-control) to keep from glazing the rotors, melting the pads, or chunking the tires. Not so with this Camaro. The 1LE kit is a bona fide track package with indefatigable brakes (Brembos up front) and Goodyear Eagle F1 Asymmetric3 rubber that wears progressively. The \$4500 package also brings engine-oil,



LIGHTNING LAP NO.10

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bare-assed Blue Oval to convention. Ironically, it's more Wild West than the Ford named after a feral horse. Its greatness lies not in the last few tenths of a second shaved from a quick lap, but in the art of managing the perfect powerslide.

2016 DODGE CHARGER SRT HELLCAT (LL3) 3:03.5

BASE PRICE: \$69,235

AS-TESTED PRICE: \$73,725

707 HP • 4564 LB • 6.5 LB/HP

TIRES: PIRELLI P ZERO, 275/40ZR-20 (106Y)

Let's be honest; nobody looks at this thing and thinks "track car." Okay, maybe parallel tracks with Christmas trees, but no track with curves. The Charger is just so big, so heavy, so utterly Woodward Avenue. And considering that it has 46 more horsepower than the second-most-powerful car on this roster, the Ferrari 488GTB, it wears pretty skimpy tires. All four corners are borne by the same 275/40ZR-20 P Zeros, as dictated by the stock Charger bodywork. The Viper ACR has 355s in back, and it only has 645 horsepower. The Hellcat is the Hulk in Gucci pumps.

That said, it's fun. You run over everything in your way; curbs, trees, flag stations, anything that threatens to make it turn any more than it really has to. And yet the main challenge in the Charger (see what we did there?) is to keep it pointed straight, because it pretty much wants to go all 4.1 miles sideways, backward, or just spinning like a Chinese pinwheel firecracker. The first time you light up a corner in full drift, you feel like a Valkyrie on the run. The problem comes at the next corner, when those same rear tires are now rubber fondue and there's no grip. One drift begets more drifting, which begets a lousy lap time. Restraint may not be your thing at the Old Country Buffet, but it's a requirement here.

Sector times, schmector times. Fine, the Hellcat posted just 0.89 g in Turn 1, about the same as a postal Jeep. It does indeed understeer, the reactor from the U.S.S. *Nimitz* being a somewhat heavy thing under the hood. Otherwise it scampered as best it could, running in a pack with far-lesser-powered but better-handling cars. Except on the main straight, where it nearly punched through to 150 mph. That's better than a number of cars shoving a heck of a lot less air out of the way, including the Chevy Corvette. Power, baby!

DEPARTMENT OF SMALL WONDERS

You Can't Spell Miata without Momentum

▼ COPELAND MOTORSPORTS MAZDA MX-5 MIATA CUP CAR 3:06.4



Turning down a drive in a race car is proof of insanity, so when Mazda kindly offered to persuade Copeland Motorsports to "volunteer" its fully prepped MX-5 Miata Cup car, we pounced. At the time of Lightning Lap, this Miata driven by Dean Copeland was leading the standings at the halfway point in the 12-round Battery Tender Global Mazda MX-5 Cup Presented by BFGoodrich. So the pressure to not bend it was heavy.

All Cup cars are built by Long Road Racing and are sold at Mazda parts counters for \$53,000 without a seat or driver restraints. The 155-hp engine and six-speed transmission are factory sealed with an aftermarket ECU to expedite spot

checks, and the suspension attachment points must be factory. Everyone runs the same BFGoodrich 215/610R-17 g-Force slicks. In this series, driver skill is what matters.

Basically a stock Miata with a roll cage but missing about 80 pounds of fluff (including the top), the Cup car pulled 1.16 g's in Turn 1, more than the Viper ACR or the Porsche 911 GT3 RS. So, yes, this is a real race car. The controls are delightfully direct, the inputs instantly producing outcomes. If you overcook a corner, the rear breaks gently out. Just relax your right foot a tiny bit to bring it back in line—it's that easy.

Because the engine doesn't make much steam—the Cup car hit a

peak speed of only 113.8 mph at VIR—maintaining momentum is the game. And because you're wearing this car like a wet suit, it's easy to find the courage to brake later and barrel into corners faster. In some of the tighter places, the Miata ran with much quicker cars, including the Ford Mustang Shelby GT350R. If VIR didn't have two long straights, this Miata would be devouring the weak here.

As with parrots and Dalmatians, a Miata racer wants to hang with others of its own kind. Alone on a track, it's fun, but it's only half the experience. To enter the first turn of a race with 40 of them clawing for the same few feet of asphalt is one of life's great automotive thrills.

LIGHT(EST) LAPS, POUNDS: 2006 Lotus Elise, **1980** • 2009 Lotus Exige S 260 Sport, **2013** • 2008 Lotus Elise SC, **2029** • 2007 Lotus Exige S, **2066** • 2016 Mazda MX-5 Miata Club, **2309** • 2006 Mazda MX-5, **2475** • 2015 Alfa Romeo 4C, **2475** • 2012 Mosler Photon, **2501** • 2013 Fiat 500 Abarth, **2554** • 2009 Mosler MT900S, **2584**



2016 JAGUAR F-TYPE PROJECT 7 (LL4) 3:02.2

BASE PRICE: \$165,995

AS-TESTED PRICE: \$175,995

575 HP • 3766 LB • 6.5 LB/HP

TIRES: CONTINENTAL CONTIFORCECONTACT

F: 255/35ZR-20 (97Y), R: 295/30ZR-20 (101Y)

—
Yes, we are skeptical Yanks, but jeez, sometimes the Brits ladle on the history a bit thick. Does a topless F-type with a shark-fin fairing and white roundels over British Racing Green paint (a \$10K option) have Le Mans D-types dancing in your head? If so, then perhaps the \$175,995 you'd pay for this one might seem worth it. Whatever you do, however, don't take this dandified cat to a track unless you want a graduate course in driving on ice, leading to a thorough tail waxing by a kid in a one-third-as-expensive BMW M2.

To a car, the Jaguars we've run here have always stood out as the oversteering handfuls, the cars most prone to go sideways when you really need them pointed at least roughly in race direction. It's a combination of high horsepower, less-than-mag-

netic tires, and the trait that the British love in their cars above all things: hyper-reactive steering combined with rock-rigid roll control. Thus, hilarious oversteer rather than safe, respectable, dull understeer. It may entrain you and blanch your passenger, but it will not make you especially fast around a circuit.

The Project 7 fits the pattern, a short wheelbase and a supercharged 5.0-liter V-8 juiced to 575 horsepower only adding to the thrills. Unfortunately, the Continental ContiForceContact tires are not up to the task of containing all that rage, the car suffering difficulties both turning and laying down the power, which led to 182.2 seconds of, well, if not terror then a slightly alarming degree of frustration. Through the various sectors, the Project 7's closest analogue is the giant, slip-sliding Dodge Charger SRT Hellcat, an absurdly hopped-up, 707-hp cop car that is nearly 800 pounds heavier. That should tell you something about the sharpness of this Jaguar's scalpel.

As with all the current R- and SVR-rated Jags, the Project 7—basically a rear-drive SVR coupe with no roof except for a simpli-

fied bikini top—rips the air with delightful chortles from its none-too-muffled engine. The brakes are good, and the car can probably be made to dance more gracefully with a few modifications.

It's darn expensive, though, and will be clobbered by cheaper (though less aurally assertive) cars on track day. Keep this particular cat out of the jungle, however, and it'll purr sweetly for you.

Averaging the Field

Mean: **3:06.0**
Median: **3:05.8**
Mode: **3:05.8** (four)

—
Including all the oddball cop cars, SUVs, kit cars, and race cars we've brought to VIR, the median lap time of 201 cars around the 4.1-mile Grand West Course is 3:05.8, which puts the polka-dotted Jaguar F-type Project 7 in the better half. But there is one notable Jag that is even quicker: the 2015 F-type R coupe. Despite being heavier and less powerful, the R lapped VIR 1.2 seconds faster than the 7. Maybe the all-wheel-drive system of the upcoming F-type SVR will prove to be the whip needed to tame the F-type at Lightning Lap No. 11.



LIGHTNING LAP NO.10

P/040 . CAR AND DRIVER . OCT/2016

DARE TO FIND YOUR NEXT PATH.
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nicative chassis, it went quickest on used tires during the afternoon of Day Two. Stubbornly durable Michelin Pilot Super Sports yielded consistent hot-weather laps within tenths of a second of each other, despite the less-than-ideal conditions. The M2's giant-killer attitude shined in sector two's Climbing Esses where its average speed is higher than the Audi R8's. And in the fast transitions of sector four, it equals the mid-engined Audi's time. The mil-spec precision of the M2's steering, brakes, and shifter provides a trustworthy foundation for purposeful driving, contributing hugely to driver confidence.

If Ford's Focus RS is the antithesis of convention, then the M2 is the dictionary definition of it—at least when it comes to rear-drive dynamics. Linear, responsive, honest, intuitive, and predictable, it's a performance coupe that does what it's told. The M2 lacks the pretense that accompanies so many modern cars. Behind its thoroughly off-the-moment control feel and responses lies the uninhibited sincerity of a 30-year-old sports car.

Never upset by curbing and always easily placed, the M2 offers the ease of driving that beginners need without compromising the speed and ability experts appreciate. There's enough power to find almost 140 mph on the front straight and sufficient balance to encourage early throttle openings at every corner exit. Its nose obediently follows commands from the thick-rimmed wheel, and when the slide comes, the M2 has already notified you of its arrival. Switch the stability control off and trust its predictable feedback. If it bites you, you probably deserve to be bitten.

2016 BMW M2 (LL2) 3:01.9

BASE PRICE: \$52,695

AS-TESTED PRICE: \$54,495

365 HP • 3455 LB • 9.5 LB/HP

TIRES: MICHELIN PILOT SUPER SPORT

F: 245/35ZR-19 (93Y), R: 265/35ZR-19 (98Y)

Here's a fact: 16 of the 18 street cars at this year's Lightning Lap went quickest in the cool morning air of Day Three. By then, every driver was accustomed to their cars' nuances, and every car that was getting new tires had them fitted in anticipation of the favorable conditions on the final day.

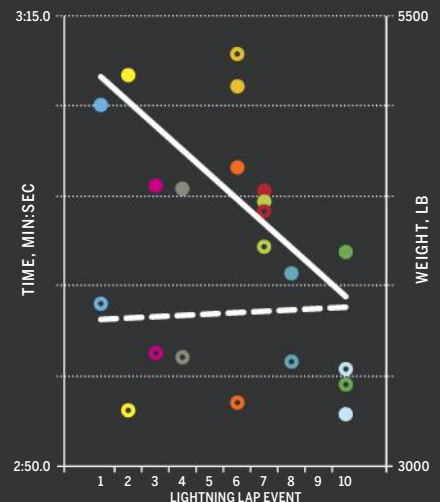
BMW's M2 was not among them. As a testament to its heat tolerance and commu-

Mmm... GmbH Cars

BMW has supplied us with 11 of its M cars for Lightning Lap. Even excluding one rather hefty SUV, though we note it here, lap times have consistently decreased despite increases in curb weights. We'll let the weight gains slide as long as the lap times keep dropping.

— Lap-time trend — Weight trend
● Lap times ● Weights

- 2006 M6
- 2007 Z4 M Coupe
- 2008 M3
- 2009 M3
- 2011 1-series M Coupe
- 2012 X5 M
- 2013 M5
- 2013 M6
- 2015 M4
- 2016 M2
- 2016 M4 GTS



LIGHTNING LAP NO.10

P/042 . CAR AND DRIVER . OCT/2016

2017 AUDI R8 V-10 PLUS (LL4)

2:56.1

BASE PRICE: \$193,950

AS-TESTED PRICE: \$202,750

610 HP • 3771 LB • 6.2 LB/HP

TIRES: PIRELLI P ZERO, F: 245/30ZR-20 (90Y)

R: 305/30ZR-20 (103Y)

The Audi R8 V-10 Plus is close kin to the Lamborghini Huracán, but after lapping the R8 at VIR, we're beginning to think that it's related in the same way that humans are to chimpanzees. Sure, the genetic makeup may be similar, but the final product is very different.

We love the similarities; if only there were more. As in the Huracán, the 5.2-liter V-10 belts it out as it revs beyond 8000 rpm. All-wheel drive maximizes traction and thus the delivery of 610 horsepower. On the front straight, the R8 hits 153.5 mph and goes a little light through the usually unexciting kink at the flag tower, a preview of what's to come.

Hard on the brakes a few seconds later, the R8 squirms as the rear end lightens and threatens to find its own course around the corner. A relatively soft chassis that provides a surprisingly supple ride on public roads gives the R8 a squirrely feel through high-speed transitions such as the Climbing Esses. A touchy brake pedal that initially delivers too little deceleration—and then too much—doesn't inspire confidence, either.

It's possible to outfit an R8 with track-appropriate Michelin Pilot Sport Cup 2 tires, but our test car arrived on more-street-friendly Pirelli P Zeros. On the track, the P Zeros heat up quickly and their grip all but evaporates. The R8 has rear-biased all-wheel drive, and greasy tires make it a challenge to control the oversteer. Based on our experience with Cup 2 tires, we'd guess that they would've been a better match for the ridiculous speeds dialed up by the R8's mighty V-10.

On the scales, the R8 weighs a not-in-substantial 340 pounds more than the Huracán, and the mass can be felt as the R8 begins to break away and keeps going. Despite the R8's tendency to monkey around, though, it's still 1.4 seconds quicker than the previous-generation R8 V-10 Plus we ran here two years ago. It feels more closely related to that Audi, though, than the Lamborghini.

The R8 is tuned to be an everyday supercar, but track days are not its best days.

NOT ALL THAT SHOCKING, ACTUALLY

Between a Watt and a Hot Place

▼ 2015 TESLA MODEL S P85D 3:17.4



Last year, online editor Alex Stoklosa made a round-trip visit to Lightning Lap IX in our long-term 2015 Tesla Model S P85D. The internet declared us negligent because we didn't lap the 463-horse electric surrey. To make amends, we had Stoklosa redo his road trip this year, with one alteration—a hot lap in the middle. The results were as expected.

Knowing that the car would perform best with a max battery charge, we started full and didn't mash the accelerator until we were coming into Hog Pen on our out lap. We had one shot to get a good lap time without having to recharge.

Slamming the brakes after hitting 137.3 mph on the front straight resulted in the pedal—

and our hearts—sinking to the floor. Fortunately the car decelerated enough to make the turn at 0.89 g, the same skidpad result the Model S got in our initial long-term test.

By the time the NASCAR bend came up, the brake pedal returned slightly, but by the exit of Snake, about 40 seconds into the lap, the 5010-pound P85D entered a reduced power mode (roughly half of the max). Up to that point, it was on pace with the Dodge Charger SRT Hellcat's 3:03.5 lap but ended up with a 3:17.4, matching the heaviest vehicle we've ever driven here, the 5317-pound 2012 Jeep Grand Cherokee SRT8.

We expected a slowish overall lap because of our experi-

ence with the car during acceleration testing. Electric wiring resistance and losses converting maximum DC-battery watts to AC-motor horses generate a lot of heat. And too much heat can permanently damage the battery, so the car protects itself by limiting current flow.

We could have asked Tesla to turn off the battery protections, but that would break our rules of engagement for production cars. It would have been the same as asking Subaru to give us a BRZ with a WRX STI's turbo engine to represent the bone-stock model. But don't fret: Stoklosa is planning his third EV venture to Alton, Virginia, next year in anticipation of yet more internet rage.

FASTEST. CLIMBING ESSES. AVERAGE SPEED. EVER, MPH: 2016 Dodge Viper ACR, **132.3** • 2015 McLaren 650S Spider, **129.4**
2017 Acura NSX, **129.3** • 2015 Chevrolet Corvette Z06, **128.4** • 2016 Ferrari 488GTB, **128.3** • 2017 Chevrolet Corvette Grand Sport, **127.6**
2014 SRT Viper TA, **126.9** • 2012 Mosler Photon, **126.8** • 2016 Porsche 911 GT3 RS, **124.7** • 2016 Mercedes-AMG GT S, **124.1**



2017 CHEVROLET CAMARO SS 1LE (LL2) 2:54.8

BASE PRICE: \$44,400
AS-TESTED PRICE: \$45,700
455 HP • 3743 LB • 8.2 LB/HP
TIRES: GOODYEAR EAGLE F1 SUPERCAR 3
F: 285/30ZR-20 (95Y), R: 305/30ZR-20 (99Y)

There's nothing apparently exotic about a Chevy Camaro SS 1LE. It weighs 3743 pounds. It lacks carbon-ceramic brakes and a dual-clutch transmission. Carbon fiber? Not a strand. Turbos? Nope. A mid-engine V-8 that revs like a dentist drill? Not here. So what is this Camaro doing lapping right behind the Porsche Cayman GT4 and ahead of the Audi R8 V-10 Plus?

It finds itself thusly positioned because, in the world of Camaros, the SS 1LE is indeed an exotic. The 1LE package brings magnetorheological dampers, stiffer springs and anti-roll bars, an electronically controlled limited-slip differential, big 14.6-inch front brakes with six-piston calipers, and forged aluminum wheels with Goodyear Eagle F1 Supercar 3 rubber. Foreign supercars, beware; in Turn 1, the SS 1LE matches the 1.11 g's of grip of the Ferrari 488GTB. In the uphill esses, the Camaro manages a higher average speed (121.6 mph) than the McLaren 570S.

The new Camaro behaves like the Z/28 we lapped two years ago, and most of its sector times are right on the heels of the Z/28's, not to mention the cars in LL4 and

LL5. It has the same supernatural grip and stability and the same super-accurate wheel control, but the 1LE isn't as nervous as the Z/28. It doesn't leap and skip over curbing as the Z/28 did, and in slow corners, such as Oak Tree and Bitch, the 1LE's front end resists breaking free and just sticks. It's only when the tires get hot and greasy that the Camaro will wag its tail or plow. Even then, it all happens in a progressive and nonthreatening manner.

Like the Cayman GT4, which is less than a second quicker, the SS 1LE lacks any bad dynamic habits. The body control, damping, brakes, and steering all feel right when the nose is aimed into the uphill esses at 129 mph. You're left to curse the annoying sightlines and concentrate on quick shifts.

To look at the price, it's clear the SS 1LE doesn't know it's not a bona fide exotic. We won't tell if you won't.

2016 PORSCHE CAYMAN GT4 (LL3) 2:54.0

BASE PRICE: \$97,780
AS-TESTED PRICE: \$104,870
385 HP • 3058 LB • 7.9 LB/HP
TIRES: MICHELIN PILOT SPORT CUP 2
F: 245/35ZR-20 (91Y), R: 295/30ZR-20 (101Y)

Two years ago, we called the Porsche Cayman S the perfect track-learning tool, but we also said it needed more power. Enter the 385-hp GT4. Porsche didn't just add 60 horsepower to the Cayman S and call it a day, though; the Cayman GT4 is a thorough chassis retune, developed around its big wing and wider and stickier Cup 2 rubber.

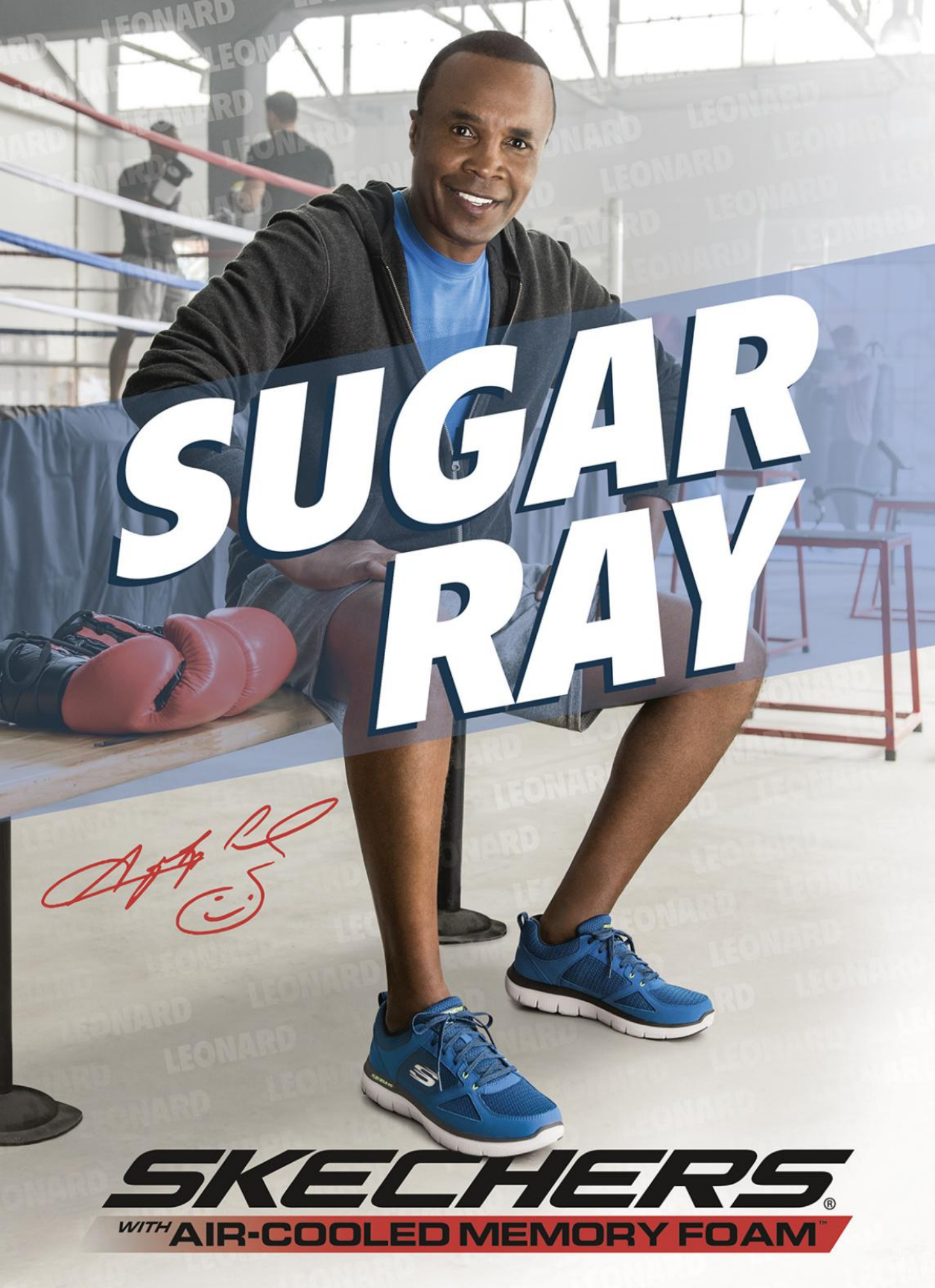
Adding horsepower is good, but grip is what gets the GT4 around the track 8.6 seconds quicker than the S. Going through Hog Pen, the GT4 drops to 70.6 mph, whereas the Cayman S dipped to 64.4. Superior grip and the stabilizing effect of its big wing allow the GT4 to maintain more of that speed. The GT4's 120.6-mph average through the Climbing Esses is 6 mph faster than the Cayman S's. And through the high-speed corners of the infield, the GT4 matches the all-wheel-drive Acura NSX's time.

At 3058 pounds, the GT4 is the lightest street car at this year's event. Low mass allows it to suffer your foolishness: Go too fast or hit the throttle too early and it's a mere instant before the chassis recovers traction. Behind the wheels are carbon-ceramic rotors that seem completely unfazed by the Cayman's mass. A firm



LIGHTNING LAP NO.10

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A full-page photograph of Leonard Roberts, a Black man, sitting on a wooden bench in a boxing gym. He is wearing a blue t-shirt, a dark grey zip-up hoodie, and blue Skechers sneakers. He is smiling at the camera. To his left, a pair of red boxing gloves lies on the bench. In the background, a boxing ring with red and blue ropes is visible, and another person is working out. The background is filled with a repeating, semi-transparent watermark of the name "LEONARD".

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brake pedal brings forth the right amount of deceleration time after time.

When you're tucked into the single-piece seat, all is calm and serene. The sightlines are panoramic. An Alcantara-skinned steering wheel transmits faithful feedback about impending slides, and the shifter finds the right gear every time. In sport mode, the engine automatically matches revs on downshifts, making it easy to concentrate on braking points. Nimble and confident, the GT4 is about as relaxing as a car can be on a track. That's the magic of this thing: Porsche kept everything we love about the Cayman S but played it at a higher speed. The GT4 treatment doesn't change the goodness, ease, and steadiness of the Cayman. It's still the perfect learning tool, but now it can teach you how to drive a supercar.

2016 BMW M4 GTS (LL4) 2:52.9

BASE PRICE: \$134,200

AS-TESTED PRICE: \$134,200

493 HP • 3538 LB • 7.2 LB/HP

TIRES: MICHELIN PILOT SPORT CUP 2

F: 265/35ZR-19 (98Y), R: 285/30ZR-20 (99Y)

BMW sent factory driver Bill Auberlen with us to VIR to "make sure" that the M4 GTS was performing as it should, which in reality meant shredding a set of Michelins. When Auberlen said, "Don't be afraid of the car,"

we couldn't help wondering why. Should we be nervous? Is the M4 GTS's water-injected 493-hp inline-six simply too much stink for the Cup 2 tires? Or are the tires undersized for the aerodynamic weight gain of the adjustable wing and splitter? Are the car's three-way adjustable dampers just too stiff, making the car sketchy over the curbing?

We're guessing he was attempting to ease any concern we might have for wadding up this bit of BMW unobtainium, only 300 of which are in the U.S., because the answer to each of our above questions is unequivocally "no." The

GTS's neutral balance flirts with oversteer at high speeds and attempts to fight off understeer in slow ones, which is totally fine because it communicates these behaviors with the kind of clarity audiophiles hope for in their equipment.

Where the base M4's steering feedback is mostly vague, the GTS's wheel transmits five-by-five. Sure, we fought to get it turned in on slow corners, and overcooking Hog Pen resulted in us drifting out of the long right-hander with a slip angle that made corner workers duck. But if we kept the GTS under the opposite-lock threshold, it proved to be nearly eight seconds a lap quicker than the car on which it is based, carrying greater speed everywhere in the lap and hitting 151.2 mph on the front straight. We did, however, expect more from the sticky Michelins than 1.03g's in Turn 1.

Aside from being faster just about everywhere on the track, the GTS out-

shines the M4 with far superior stability, averaging nearly 9 mph more in the Climbing Esses than the M4 and 3.1 mph more through the infield section of sector four. The scariest thing about this car is how far down the leader board it falls, but that is less a reflection of the GTS's performance than of how fierce its competition is this year.

2016 FORD MUSTANG SHELBY GT350R (LL2) 2:51.8

BASE PRICE: \$63,495

AS-TESTED PRICE: \$66,495

526 HP • 3718 LB • 7.1 LB/HP

TIRES: MICHELIN PILOT SPORT CUP 2

F: 305/30ZR-19 (98Y), R: 315/30ZR-19 (100Y)

So close. The Ford Mustang Shelby GT350R is less than a second slower than the Chevy Camaro Z/28 we lapped two years ago. But while the times are nearly identical, the experiences couldn't be more different.

Next to the Z/28, which leaps over curbing and pounds the track into submission, the GT350R sops up the harsh stuff without upsetting the chassis or the driver. It's 143 pounds lighter than the Z/28, its steering requires less muscle, and overall it comes across as more nimble and about three feet narrower. Ford's high-revving DOHC 5.2-liter V-8 delivers torque more progressively and smoothly than the Chevy's pushrod 7.0-liter small-block. On corner exits, it proves easier to get on the power sooner and harder without having to worry about overwhelming the rear tires.

But in Turn 1, the GT350 can't match the Z/28's grip, ceding a little bit of time to the Chevy. The Ford's deficit grows in each subsequent sector, a couple of tenths here and there. The GT350 may be easier on the driver than the Z/28, but its Pilot Sport Cup 2 tires can't match the grip of the Z/28's Pirelli P Zero Trofeo R rubber. Unlike the Chevy Corvette Grand Sport's Cup 2s, the Ford-spec Michelins seem to have more consistent grip from the first lap to the last, but they never deliver the race-rubber-like initial grip of the Vette's tires, which tapers off after a couple of laps.

We're still deeply in love with the GT350R. It's a brilliant track car with a balanced chassis and inexhaustible brakes. We love that every time the throttle opens, it sounds as if a million tiny hammers were being fired into the exhaust. It might not have beaten the Z/28, but love isn't always quantifiable.



LIGHTNING LAP NO.10

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THE FULL GRIPPING STORY

The Rise of the Super Street Tire

The leap that street tires have made in performance since we started Lightning Lap is staggering. At the inaugural event in 2006, the hottest tire was the Dodge Viper SRT10's Michelin Pilot Sport, which hung on in Turn 1 at 1.01 g's. Last year, the Chevy Corvette Z06's Michelin Pilot Sport Cup 2 ZPs pulled 1.20 g's in the same corner. Michelin has been at the tip of the performance spear for the

last decade [see "Grip Leader Board"]. According to Lee Willard, the tire designer responsible for the Corvette's Pilot Super Sports and Pilot Sport Cup 2s, Michelin has broken traditional tire compromises, such as the head-butting between wet and dry grip, with the use of advanced computer modeling. How advanced? Michelin's mathematical model of a single tire, or the computer file that fully encapsulates the tire's design and performance, is comparable to the size of a mathematical model for an entire car. Changing even a single filament in a cord—

Grip Leader Board

Maximum grip in Turn 1 from every Lightning Lap

LL	TIRES	GRIP
No.1	Michelin Pilot Sport	1.01 g
No.2	Pirelli P Zero	0.98 g
No.3	Michelin Pilot Sport Cup	1.16 g
No.4	Michelin Pilot Sport PS2 ZP	1.06 g
No.5	Toyo Proxes R888	1.07 g
No.6	Michelin Pilot Sport Cup ZP	1.07 g
No.7	Michelin Pilot Super Sport	1.08 g
No.8	Michelin Pilot Sport Cup 2 and Pirelli P Zero Trofeo R	1.16 g
No.9	Michelin Pilot Sport Cup 2 ZP	1.20 g
No.10	Michelin Pilot Sport Cup 2 ZP	1.19 g

say, from high-strength steel to aramid, the stuff bullet-proof vests are woven from—or even changing the cord's relative angle or weave results in a virtual tidal wave of other tiny changes no human could ever predict or compute. Running a computer simulation on four tires, a process that took months in the 1990s, now takes an hour,

allowing engineers more time to fine-tune the final product. Willard also points out that the highest-performance street tires are no longer peaky—i.e., dangerously losing traction midcorner. If this pace continues, street tires will soon have more grip than the 1.28 g's generated by the Yokohama slicks fitted on the Lexus proto-racer.

HIGHEST MINIMUM SPEED IN SPIRAL, MPH: 2015 Chevrolet Corvette Z06, **47.1** • **2016 Dodge Viper ACR, 47.1** • 2015 Porsche 918 Spyder, **46.4** • 2016 McLaren 570S, **46.0** • 2016 Porsche 911 GT3 RS, **44.9** • 2012 Lexus LFA, **44.7** • 2014 Chevrolet Corvette Stingray, **44.3** • **2017 Chevrolet Corvette Grand Sport, 44.3** • 2009 Mosler MT900S, **43.9** • 2014 Ferrari F12berlinetta, **43.9** • 2015 McLaren 650S Spider, **43.9**

2017 ACURA NSX (LL4)

2:50.2

BASE PRICE: \$186,800

AS-TESTED PRICE: \$203,100

573 HP • 3854 LB • 6.7 LB/HP

TIRES: PIRELLI P ZERO TROFEO R

F: 245/35ZR-19 (93Y), R: 305/30ZR-20 (103Y)

From the first session on the first day, we suspected that this complicated new hybrid machine would be a difficult onion to peel, and it was. It took all three days, a second or two chipped away each day, to learn its layers and get it down to its ultimate lap time of 2:50.2. The attending Acura engineers pronounced themselves satisfied with our results, and the NSX proved to be the third-quickest car overall through the Climbing Esses, one of the circuit's most

daunting sections. We were never quite satisfied, though. When you're this close to breaking into the 2:40s, such feelings are inevitable.

The only car in the test that is completely new from the ground up starts at \$156,940 and surpasses 200 grand with our \$46,160 suite of options (about \$30K of which makes it go faster), meaning that it's expensive and powerful and its lap time should be down there with the expensive and powerful cars. The Ferrari-like options include \$9900 carbon-ceramic brakes, a \$9000 carbon exterior package, and \$6000 pearl-red paint. The Pirelli P Zero Trofeo R neo-slicks, at \$1960, weren't mentioned in any of the pre-launch publicity and are, like the Michelin Pilot Sport Cup 2s we did know about, a dealer-installed option. Meaning that if you want to replace the

standard Continentals with these Pirellis, the dealer will call Tire Rack and order them for you. Hmm.

Though it has supercar stats and pricing, the 573-hp, 3854-pound NSX is also heavy and just a bit too polite to pass itself off as a track animal. The fact that it is beaten by a Chevy Corvette—which, granted, outpaces a number of pricier cars—only exacerbates the nagging feeling that maybe it had a little more left to give. And boy, did we wring its neck trying to find it.

First things first: Switch everything off. Unlike some other cars here with more-transparent track modes, the NSX's stability control is not yet smarter than a good driver. Then put instinct aside and trust the electrified front axle to do its work. After the engine and electric motors make a seamless and linear charge, a hard,



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reliable brake pedal gets the car slowed, the torque-vectoring system dragging the inside-front wheel while overdriving the outside to help point the nose at the apex. Then, as the Trofeos are on the ragged edge of grip and your foot wavers on the gas, reluctant to push further lest the front tires wash out, you have to gun it. Squeeze the gas and let the front motors do their trick, tractoring the car out of the corner and flinging it forward. Like another hyper-hybrid, the Porsche 918 Spyder we had a couple of years ago, the NSX is most startling coming off a slow corner. But you must learn to exploit it. It took us a while.

So it's polite, but that's not necessarily a negative. After pounding around in the explosive Ferrari or the booming Dodge Viper, our frazzled, overstimulated brain-stems immediately relaxed as the NSX



THE UN-LEXUS

Aptitude for Laptitude

▼ 2016 LEXUS RC F GT CONCEPT 2:43.2



We can't classify this thing as a real car because it's not. Yet.

This special RC F is a one-off prototype vision for a track-only toy like the Aston Martin Vulcan. Lexus plans to sell it in Japan to rich folk who would rather do playtime in local products than in imports. With carbon-fiber bodywork, polycarbonate windows, and 721 pounds of Lexus luxury scrubbed from its curb weight, the RC F GT concept is pure track rat. For example, there's a bare interior, just metal painted black, with a full roll cage and, instead of a center console, there's a carbon-fiber switch plate with aircraft-style toggles and a bank of push fuses.

Twist the big red master power handle and throw a switch; the fuel pump behind you fires

with a piercing, distinctly un-Lexus-like "Scree!" Then the V-8 barks to life with a ferocity rare among Toyota products. We're going with 500 horsepower from the mildly breathed-on 5.0-liter V-8, since Lexus refuses to give us the actual rating.

This car posted the quickest time this year because it's effectively a race car. It recorded 1.28 g's in Turn 1, establishing a lead on the Dodge Viper and Ferrari 488GTB that they could never reel in. Its lap time is just 0.1 second slower around VIR than our all-time LL hero, the Porsche 918 Spyder. It went bounding over the curbs on its Yokohama racing slicks, roaring loud enough inside to make your ears bleed, yet attitudinally completely neutral, the driver

snugged into the carbon Recaro bucket by fat green Takata belts, in total command of the grip. It's not hard to picture 40 of these things making a rousing Japanese Sprint Cup series, decked out in Hello Kitty, Super Autobacs, and Ichiran sponsor logos.

If this Nipponese NASCAR Impala has a weakness, it's the eight-speed automatic with its software directly lifted from the production car. It's simply too slow to respond to paddle inputs, even in the sportiest "expert" setting, though the upshift light is a welcome aid. Nevertheless, this Lexus is hugely entertaining and a signal that Toyota gets it. May it portend more cars like this from Lexus and Toyota, machines with true driving spirit.

HEAVIEST METAL LAPPED, POUNDS: 2016 Dodge Charger SRT Hellcat, **4564** • 2014 Audi RS7, **4442** • 2012 Porsche Panamera Turbo S, **4434** • 2013 BMW M5, **4425** • 2014 Jaguar XFR-S, **4415** • 2014 Mercedes-Benz E63 AMG S-model, **4400** • 2011 Jaguar XFR, **4395** • 2013 Audi S6, **4369** • 2012 Dodge Charger SRT8, **4355** • 2011 Mercedes-Benz E63 AMG, **4313**



hummed out of the paddock, exuding a calm, precision-machined proficiency. As in the original, the new NSX has a low dash and its cockpit is set forward. Its seats are broad and welcoming. Actually, a little more seat bolster would have been nice for this exercise, but Acura wants to sell a daily supercar, which means a flatter seat. At speed, the twin-turbo V-6 trills in a fast, racy cadence, but it's no hysterical all-day shrieker. Though designed and built in Ohio, with its engine parts cast in England, it's somehow all Japanese.

2016 McLaren 570S (LL4)

2:47.4

BASE PRICE: \$206,050

AS-TESTED PRICE: \$219,670

562 HP • 3189 LB • 5.7 LB/HP

TIRES: PIRELLI P ZERO CORSA

F: 225/35ZR-19 (88Y), R: 285/35ZR-20 (104Y)

Last year, the 3276-pound McLaren 650S Spider hit 162.8 mph on the front straight of a lap lasting 2:45.8. This year, the 3189-pound McLaren 570S hits 162.8 mph there in a lap just 1.6 seconds slower. Like you, we first thought for sure McLaren smuggled a cheater V-8 in the 570S it delivered to VIR. What the top-end number doesn't tell you, though, is that the 570S lacks all the aero aids the 650S gets. There is no rear wing snapping to vertical under braking or tipping up slightly to improve downforce, thus

robbing top-end speed. Plus, the 570S isn't bolstered by the hydropneumatic suspension magic of pricier McLarens.

Without any aero grip or trick suspension, the 570S is forced to stick to the road the old-fashioned way, with tires, conventional dampers, and gravity. Narrow 225s in front amplify steering feedback while the 285 rears, the same width of the Chevy Corvette Grand Sport's front tires [see "The Fighting 47th," next page], struggle to maintain purchase on corner exit.

This relatively low-tech—and subsequently low-grip (just 1.05 g's in Horse Shoe)—approach to performance allows the car to move around. A lot. Under braking, the rear end wiggles like a scared dog without its ThunderShirt. Over the curbing in the Climbing Esses, which it enters at

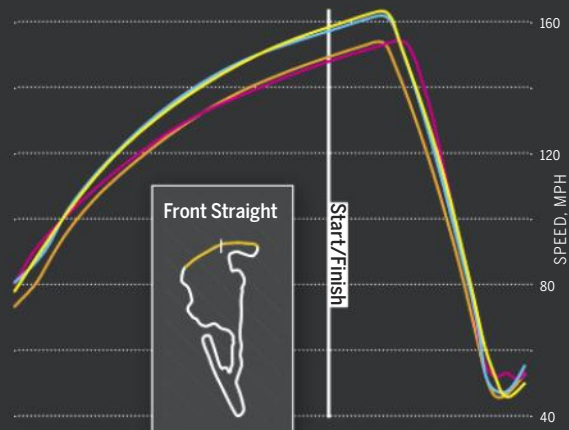
139.4 mph, the 570S bounces and threatens unwanted vector adjustments, leaving us looking for ThunderShorts a couple of times. The car feels livelier than any other sports car on the market today.

At eight- or even nine-tenths of its capability, this vitality invigorates. At the limit, however, it delivers fear, gratification, and euphoria—in that order—high-speed corner after high-speed corner. We'd lap this car all day in the 2:52 range, but a 2:47.4 feels like a Tinder date with disaster. Plus, McLaren gave us a bogey time: the 650S plus 2.5 seconds. We came in well under that mark and were happy, even if the McLaren techs thought there was a little more to get. (They always think there's more.) We certainly weren't going to find any more speed on the front straight.

Speed Traps

The McLaren 570S may not have posted the quickest lap, but it was the fastest thing on the track, hitting 162.8 mph. Of the four fastest cars we recorded, note the Porsche 911 GT3 RS's trace: It dips below the Audi R8's just north of 130 mph because of aero drag.

- McLaren 570S
- Ferrari 488GTB
- Porsche 911 GT3 RS
- Audi R8 V-10 Plus



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2017 CHEVROLET CORVETTE GRAND SPORT (LL3) 2:47.1

BASE PRICE: \$79,930

AS-TESTED PRICE: \$92,060

460 HP • 3445 LB • 7.5 LB/HP

TIRES: MICHELIN PILOT SPORT CUP 2 ZP

F: P285/30ZR-19 (94Y), R: P335/25ZR-20 (99Y)

Basically, the Grand Sport is a Zo6 with 460 horsepower instead of 650. Like the Zo6, it's weaponized fiberglass, just with a little less fissile material. Equipped with the \$7995 Zo7 package, which adds Michelin Pilot Sport Cup 2 tires and carbon-ceramic brakes, the Grand Sport clings to Turn 1 with 1.19 g's of grip, a close second to the Zo6's 1.20 g's, the most grip we've ever recorded in that corner.

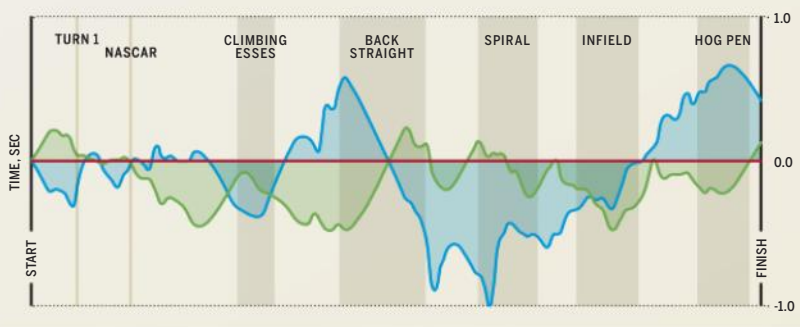
Like the Zo6's tires, the Cup 2s have just a couple of laps in them to get a best time. After that, the tires plateau, lose a bit of grip, and add about a second or so to the stopwatch. Same pressure on the driver as the Zo6 exerts, in other words.

Unlike the Zo6, though, the Grand Sport can only be had with the Zo6's Stage 2 aerodynamic package. Chevy engineers deemed the higher-downforce Stage 3 setup from the Zo6 to have too much drag for the Grand Sport's less powerful engine, so here the center part of the wickerbill is shorter and the ends of the front splitter are smaller. The Grand Sport strikes a good-enough balance of downforce and power to keep it in the Zo6 hunt. In the 80-to-90-mph right-left-right transitions of the infield, the Grand Sport's average speed is only a half-mph off the Zo6's. It's not until the exit that the Zo6's superior power helps it pull away. In the Hog Pen right that leads

THE FIGHTING 47TH

Three Different Approaches to Lapping VIR in 2:47

A battle of grip versus power waged in the 2:47 club this year as a front-engined Chevy (●), a rear-engined Porsche (●), and a mid-engined McLaren (●) all ended up within 0.4 second of each other. Power and minimal aero trickery allowed the 562-hp 570S to hit 162.8 mph on the straight, 9 mph faster than the 500-hp 911 GT3 RS and 16.6 mph faster than the 460-hp Corvette. But, without the wings, spoilers, and obese rubber of the Porsche and Chevy, the McLaren's power couldn't help it in high-speed corners. Zeroing in on the Climbing Esses shows that the McLaren lost 29.3 mph from entry to exit (139.4 mph to 110.1) as the driver fought to stabilize the car while searching for grip. In the same section, the GT3 RS went in at 137.2, but only dropped 19.0 mph. The Corvette entered the slowest (133.5 mph) and pounded out of the sector at 120 mph, a drop of only 13.5 mph.



to the straight, the Grand Sport strains your neck for one second with 1.45 g's of cornering stick, a figure that matches that of the Dodge Viper ACR. Through the Climbing Esses, the Grand Sport only gives up two-tenths to the Zo6.

From behind the wheel, the two cars are pretty much identical. The competition

seats are the same, the steering is just as heavy, and the shifter is just as likely to find fifth gear instead of third as it is in the Zo6. Both have the same supernatural stability, stiff springing, gentle damping, and generous wheel travel. We'd have a hard time justifying the extra spend for the Zo6.

Over the uphill esses—on a public road,



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this sector would likely have a recommended speed of 45 mph—it goes in at 133.5 mph, strikes the right-hand curbing at 130, leaps, and sticks the landing. Do this in a plane and the landing gear would probably collapse. Corvette ride-and-handling engineer Jim Mero laughs and says it's like landing in pillows. No, Jim. No.

2016 PORSCHE 911 GT3 RS (LL4) 2:47.0

BASE PRICE: \$189,760

AS-TESTED PRICE: \$195,020

500 HP • 3155 LB • 6.3 LB/HP

TIRES: MICHELIN PILOT SPORT CUP 2

F: 265/35ZR-20 (99Y), R: 325/30ZR-21 (108Y)

It's not as scary as it looks. Everything that makes the Porsche 911 GT3 RS intimidating—the tires that barely fit, the shark gills on the fenders, the ironing board hanging off the tail—makes for a friendlier car on the track. The tires, vents, and that wing work to make your palms just a bit less

sweaty as you nose the \$189,760 GT3 RS into the fast Climbing Esses at 137 mph.

Sweat is an issue in this particular GT3 RS because there's no A/C. There's no radio, either. Surprisingly, Porsche doesn't charge for either inconvenience. Add in the carbon-fiber fenders, and the RS is 172 pounds lighter than the 3327-pound GT3 we drove here last year. It is faster through every track section than that GT3, but the character and the lap-to-lap consistency are similar. The 4.0-liter flat-six has 25 more horsepower, but it still drills into your eardrums when the dual-clutch automatic clips off a redline shift. The lightly assisted steering is just as sharp, and the single-piece carbon-fiber chairs—also shared with the 918 Spyder—keep your torso from slumping over when the GT3 RS grabs 1.14 g's in Turn 1.

The RS's Cup 2 rubber is wider than the standard-issue GT3's, punching up grip in every part of the track. A light nose—only 38.3 percent of the RS's 3155 pounds rests on the front end—likely contributes to the low-speed understeer, but front-end grip improves with cornering speed.

It takes a lot of provocation to get the GT3 RS's tail to slide, although an off-camber corner in the infield will briefly overwhelm the steamroller 325/30R-21 rear tires. In every other one of VIR's 24 corners, it's possible to open the throttle and trust that the rear end, complete with four-wheel steering, will stay bonded to the tarmac. It exits the sweeping high-speed transitions of the infield at 98 mph, 6 mph faster than the GT3 and the third-fastest speed we've ever recorded, behind the 2015 Chevy Corvette Z06 and the 2015 918 Spyder.

Sliding through Hog Pen, the double-apex right we enter at more than 90 mph and which opens onto the front straight, the GT3 RS is a mere 0.2 second behind the Grand Sport. Leaving Hog Pen to attack the straight, the GT3 RS's corner-exit facility gives it a 3.8-mph advantage (109.9 mph to 106.1), which is just enough speed to reel in the Grand Sport in what would be a 0.1-second photo finish. Still, as Porsche's win at Le Mans reminded us this year, the lap isn't over until you cross the finish line.

INFIELD AVERAGE SPEED LEADERS, MPH: 2016 Dodge Viper ACR, **86.8** • 2015 Chevrolet Corvette Z06, **84.5** • 2017 Chevrolet Corvette Grand Sport, **84.0** • 2015 Porsche 918 Spyder, **83.4** • 2014 SRT Viper TA, **83.2** • 2016 Porsche 911 GT3 RS, **83.1** • 2015 Lamborghini Huracán LP610-4, **82.9** • 2008 Dodge Viper SRT10 ACR, **82.6** • 2016 Ferrari 488GTB, **82.0** • 2009 Mosler MT900S, **81.3**



2016 FERRARI 488GTB (LL5) 2:45.1

BASE PRICE: \$295,043
AS-TESTED PRICE: \$358,383
661 HP • 3428 LB • 5.2 LB/HP
TIRES: MICHELIN PILOT SPORT CUP 2
F: 245/35ZR-20 (91Y), R: 305/30ZR-20 (103Y)
—

This car, maybe more than any other, marks the end of an era. Put a fork in high-revving, naturally aspirated engines; they're done. All new performance engines will have a charger of some kind, and Ferrari, the seminal stalwart of 9000-rpm flat-plane-crank screamers, has adopted two turbochargers for its mid-engine V-8-powered supercar. And a smaller V-8 at that.

But this 3.9-liter isn't your average shrunken head. Unlike Italian towns that turn sleepy during the hot afternoon siesta, this engine is pumped full of espresso and ready to rev no matter where the needle might sit on the 10,000-rpm tach. That said, the torque delivery is more binary than the linear 458's, and the fuel cutoff is a few hundred revs short of the indicated 8000-rpm redline. So making use of every last rev is difficult.

The transition from 458 Italia to 488GTB brought an additional 99 fully caffeinated horses to the mix. Coming out of Hog Pen at 111.9 mph, the 488's 661 stallions went through gears like a 1.0-liter sport bike, pushing the car to 161.7 mph on the straight, which is only 3.7 mph more than the higher-drag 458. This car, the only one in this test to reach its top gear during a lap, shifted into seventh three times per lap, at about 151 mph. That's because the 488's gears, except

for seventh, are exceptionally short, the final highway-cruising ratio bringing a discernible decrease in acceleration.

But a lazy top gear is no cause for concern; this thing is otherwise built for the track. Aside from laying down a 2:45.1 lap, making it the fourth-quickest road car in Lightning Lap history and 0.7 second quicker than McLaren's 650S from last year, it does so without ever zapping confidence—there's nary a tail wag nor a whiff of fade from its carbon-ceramic rotors. It clobbered the curbs of the Climbing Esses, averaging 128.3 mph without flinching.

After the first session in this \$358,383 car, more than \$60K of which is for options that don't make it go faster, we were confident enough to fully deactivate stability control, trusting the car to do its thing, communicate clearly, and basically be as Italian as a cigarette chased by limoncello.

The Ferrari-spec Michelin Sport Cup 2s grab asphalt by the fistful and are capable of

taming the low-end turbo grunt. The front is just stuck. In Oak Tree, a struggle spot even for the Viper ACR, the 488's direction felt guided by a slot in the track.

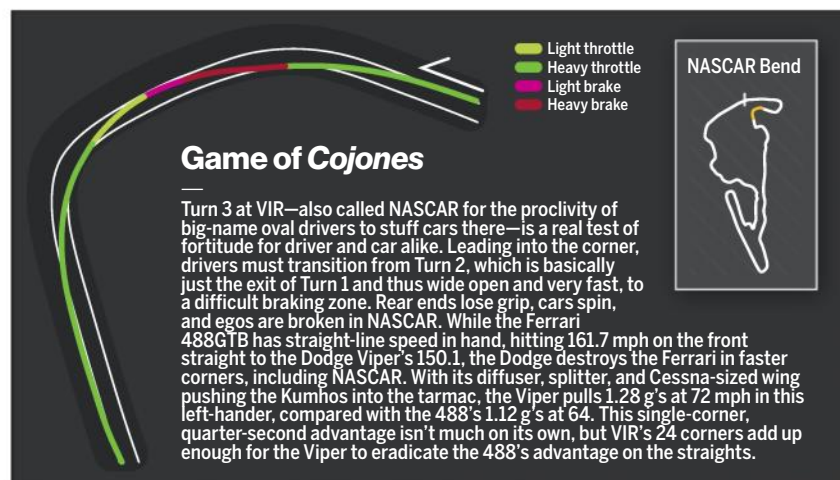
The 488 delivers satisfaction by the dump-truck load. Acceleration comes with a familiar Ferrari intake wail in the cabin, but onlookers are left straining to hear the leftovers from the muffling turbos. If the lack of noise is the worst thing about this turbo-era Ferrari, then, ladies and gentlemen, the turbo era is going to be a great one.

2016 DODGE VIPER ACR (LL4) 2:44.2

BASE PRICE: \$130,290
AS-TESTED PRICE: \$139,790
645 HP • 3400 LB • 5.3 LB/HP
TIRES: KUMHO ECSTA V720 ACR
F: P295/25ZR-19 90Y, R: P355/30ZR-19 90Y
—

As with the Porsche 911 GT3 RS and various other action heroes, the Dodge Viper ACR is festooned with all kinds of fins, vents, and dive planes. Add in the ankle-amputating splitter, a multi-position rear wing, five-point belts, dampers with rebound and compression adjustments, and tires so wide they could steamroll sidewalks and you end up with a genetically modified organism spliced specifically for VIR.

To get the most front-end downforce, we were instructed to remove the front vents, which would maximize the extraction of high-pressure air under the fenders. We were also taken aback by the advice to set the rear wing to its least aggressive angle of attack. Viper engineer Chris Winkler, a talented driver himself, says the ACR doesn't need tons of rear wing at VIR because the diffuser works so well at suck-



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ing the car to the ground. If the wing were in its max-attack position, which is ideal for shorter, tighter venues, the ACR would make more than 1200 pounds of downforce at 150 mph before braking for Turn 1. To bear up under this aerodynamic overload, Winkler and company fitted springs more than two times stiffer than the granitic SRT Viper TA's. Public roads aren't recommended.

From the first lap, it's apparent that this car sprouts roots in corners to grip with neck-straining force. The massive Kumho tires, a custom blend of darn-near race rubber measuring 355 millimeters wide in back (times 2, so about 28 inches of rear tread smooching the road), never threaten to break traction.

Getting the ACR down to 2:44.2, the second-fastest production-car lap we've ever recorded, requires complete driver recalibration. Whereas the 488 and the GT3 RS are scalpel-sharp, the ACR is one mother of a heavy ax. The steering requires genuine muscle, and the brake pedal is a rock-solid hydraulic column of confidence. The 8.4-liter V-10 turning the cabin into a sweat lodge isn't a revver, topping out at 6400 rpm with its 645 peak horsepower coming just 200 rpm earlier. Unlike the 2015 Chevy Corvette Z06, there is no rev-match system for downshifting. The heel-and-toe technique demanded is strictly old-school—and a workout given the long-travel clutch and taut shifter.

The key to getting the ACR up to speed is knowing—and, more importantly, believing—that you can get back on the throttle a few beats earlier than should be possible. This makes 70-plus-mph apexes, like the one at VIR's NASCAR corner, exhilarating, bouncing over the curbing wide open in third gear. Entering the Climbing Esses at 139.0 mph and only dropping 16.1 mph through the sector comes down to either pro-racer gumption or fool's courage, but the car did it. The sensory overload of 1.20-plus g's in the left-right-left-right sequence fries nerve endings.

In the rhythm section of the infield, the ACR's downforce comes into play in a big way. Despite having less mechanical grip than the Corvette Grand Sport, as verified by the Viper's lower g's in Turn 1—1.15 to the Vette's 1.19—the ACR outpaces the Vette there by 2.8 mph, averaging 86.8 (a record). It is here that we also experience high-speed understeer. Fortunately, Winkler had warned us of this, because it feels a lot like a flat tire at 90 mph.

Unfortunately, though, it looks as if these hot days in June will be the last laps we'll ever turn in a Viper: Its Conner Avenue Assembly plant in Detroit is scheduled to close next year, taking the Viper out with it. That's too bad. This ax can win any knife fight that comes its way.

HIGHEST MINIMUM SPEED IN HOG PEN, MPH: 2016 Dodge Viper ACR, **75.9** • 2015 Chevrolet Camaro Z/28, **73.6** • 2017 Chevrolet Corvette Grand Sport, **73.5** • 2015 Chevrolet Corvette Z06, **72.7** • 2011 Chevrolet Corvette Stingray, **72.6** • 2009 Mosler MT900S, **71.8** • 2015 Lamborghini Huracán LP610-4, **71.5** • 2008 Dodge Viper SRT ACR, **71.2** • 2016 Porsche 911 GT3 RS, **70.7** • 2016 Porsche Cayman GT4, **70.6**

The Final Countdown

Depicted here in descending order are all 201 lap times—for 191 feature cars, two kit cars, two SUVs, two cop cars, one econobox, one electric car, one race car, and one concept car—from 10 Lightning Lap events and one stand-alone test.

LAP TIME, MIN:SEC (Class, Event) Model Year and Make/Model

3:37.7 (Econobox, No.9)
2015 Honda Fit EX

3:29.3 (LL1, No.1)
2006 Mazda MX-5

3:27.3 (LL1, No.6)
2012 Volkswagen Jetta GLI

3:27.3 (LL1, No.7)
2013 Fiat 500 Abarth

3:26.6 (LL1, No.3)
2008 Volvo C30 Version 2.0

3:26.5 (LL1, No.1)
2006 Honda Civic Si

3:25.1 (LL1, No.1)
2007 Volkswagen GTI

3:24.8 (LL2, No.3)
2008 Honda Civic Si Mugen

3:24.1 (LL1, No.6)
2012 Honda Civic Si

3:23.0 (Cop Car, No.7)
2013 Chevrolet Caprice PPV

3:22.9 (LL1, No.2)
2007 Mini Cooper S

3:21.8 (LL2, No.3)
2008 Volkswagen R32

3:21.4 (LL1, No.7)
2013 Ford Focus ST

3:20.9 (LL1, No.1)
2006 Ford Mustang GT

3:20.8 (LL1, No.3)
2008 Dodge Caliber SRT4

3:20.8 (LL1, No.9)
2016 Mazda MX-5 Miata Club

3:20.6 (LL1, No.1)
2006 Chevrolet Cobalt SS Supercharged

3:20.4 (LL1, No.8)
2014 Ford Fiesta ST

3:19.3 (LL1, No.4)
2010 Volkswagen GTI

3:19.3 (LL1, No.8)
2015 Volkswagen GTI

3:19.0 (LL1, No.1)
2006 Mazda RX-8

3:19.0 (LL2, No.3)
2008 Subaru Impreza WRX STI

3:18.6 (LL1, No.7)
2013 Subaru BRZ

3:18.4 (LL2, No.6)
2012 Mini Cooper Coupe JCW

3:18.2 (LL2, No.1)
2006 Dodge Charger SRT8

3:17.8 (Cop Car, No.7)
2013 Dodge Charger Pursuit

3:17.6 (LL1, No.8)
2014 Ford Focus ST

3:17.5 (LL2, No.3)
2008 Infiniti G37S

3:17.4 (SUV, No.6)
2012 Jeep Grand Cherokee SRT8

3:17.4 (Electric Car, No.10) 2015 Tesla Model S P85D

3:17.1 (LL1, No.4)
2009 Mini Cooper JCW

3:16.7 (LL2, No.5)
2010 Mazda RX-8 R3

3:16.6 (LL2, No.3)
2008 Lotus Elise SC

3:16.6 (LL1, No.4)
2009 Subaru Impreza WRX hatchback

3:16.5 (LL1, No.5)
2011 Subaru Impreza WRX sedan

3:16.3 (LL2, No.3)
2008 Dodge Challenger SRT8

3:16.2 (LL1, No.4)
2010 Mazdaspeed 3

3:16.0 (LL1, No.2)
2007 Mazdaspeed 3

3:15.7 (LL1, No.2)
2007 Pontiac Solstice GXP

3:15.6 (LL1, No.9)
2015 Ford Mustang EcoBoost

3:15.5 (LL1, No.8)
2015 Subaru WRX

3:15.4 (LL1, No.9)
2015 Mini Cooper Hardtop JCW

3:15.0 (LL2, No.3)
2008 Honda S2000 CR

3:14.8 (LL1, No.4)
2010 Hyundai Genesis Coupe 3.8

3:14.6 (LL2, No.3)
2008 Audi S5

3:14.6 (LL1, No.9)
2015 Volkswagen GTI

3:14.0 (LL2, No.3)
2008 Lexus IS F

3:14.0 (LL2, No.6)
2012 Volkswagen Golf R

3:13.9 (LL1, No.7)
2013 Hyundai Genesis Coupe 3.8 R-spec

3:13.8 (LL1, No.5)
2011 Hyundai Genesis Coupe 3.8 R-spec

3:13.8 (LL2, No.5)
2011 Subaru Impreza WRX STI sedan

3:13.8 (LL2, No.6)
2012 BMW 335is

3:13.7 (LL2, No.3)
2008 BMW 135i

3:13.5 (LL1, No.1)
2006 Mitsubishi Lancer Evolution MR

3:13.4 (LL2, No.8)
2014 Lexus IS350 F Sport

3:13.3 (LL2, No.3)
2008 Mitsubishi Lancer Evolution MR

3:13.3 (LL1, No.4)
2010 Ford Mustang GT

3:13.2 (LL2, No.7)
2012 BMW 335i Sport Line

3:13.0 (LL1, No.3)
2008 Chevrolet Cobalt SS

3:12.5 (LL1, No.1)
2006 Nissan 350Z Track

3:12.5 (LL1, No.5)
2011 Ford Mustang V-6

3:12.3 (LL2, No.9)
2015 Volkswagen Golf R

3:12.0 (LL2, No.4)
2009 Nissan 370Z NISMO

3:11.7 (LL2, No.2)
2007 BMW Z4 M coupe

3:11.3 (LL2, No.9)
2015 Audi S3

3:11.2 (LL3, No.2)
2007 Audi RS4

3:11.1 (SUV, No.6)
2012 BMW X5 M

3:11.0 (LL2, No.1)
2007 Ford Shelby GT500

3:10.8 (LL2, No.4)
2010 Audi S4

3:10.6 (LL2, No.5)
2010 Mitsubishi Lancer Evolution SE

3:10.5 (LL2, No.2)
2007 BMW 335i coupe

3:10.5 (LL2, No.8)
2015 Subaru WRX STI

3:10.4 (LL3, No.6)
2012 BMW Z4 sDrive35is

3:10.1 (LL2, No.6)
2012 Dodge Charger SRT8

3:10.0 (LL3, No.1)
2006 BMW M6

3:09.8 (LL3, No.7)
2013 Audi S6

3:09.5 (LL2, No.1)
2006 Porsche Cayman S

3:09.5 (LL2, No.4)
2010 Chevrolet Camaro SS

3:09.4 (LL2, No.6)
2012 Dodge Challenger SRT8 392

3:09.3 (LL2, No.1)
2006 Chevrolet Corvette Z51

3:09.2 (LL2, No.1)
2006 Lotus Elise

3:08.9 (LL3, No.5)
2011 Jaguar XFR

3:08.8 (LL2, No.9)
2015 Alfa Romeo 4C

3:08.6 (LL2, No.5)
2011 Ford Mustang GT

3:08.4 (LL2, No.4)
2009 Audi TTS

3:08.3 (LL3, No.5)
2011 Lotus Evora

3:07.7 (LL2, No.10)
2016 Audi TTS

3:07.4 (LL2, No.4)
2010 Ford Shelby GT500

3:07.2 (LL2, No.8)
2014 BMW M235i

3:06.9 (LL3, No.5)
2011 Mercedes-Benz E63 AMG

3:06.8 (LL2, No.8)
2014 Cadillac CTS Vsport

3:06.7 (LL3, No.8)
2014 Jaguar XFR-S

3:06.6 (LL2, No.6)
2011 BMW 1-series M

3:06.5 (LL2, No.3)
2008 Mercedes-Benz C63 AMG

3:06.4 (LL3, No.4)
2010 Jaguar XKR

3:06.4 (Race Car, No.10) 2016 Mazda MX-5 Miata Cup Car

3:06.3 (LL3, No.6)
2012 Mercedes-Benz C63 AMG coupe

3:05.9 (LL2, No.2)
2007 Ford Shelby GT500

3:05.9 (LL2, No.8)
2014 Mercedes-Benz CLA45 AMG

3:05.9 (LL3, No.10)
2016 Lexus GS F

3:05.8 (LL4, No.2)
2007 Porsche 911 Turbo

3:05.8 (LL3, No.4)
2009 Porsche Cayman S

3:05.8 (LL3, No.4)
2009 Porsche 911 Carrera S

3:05.8 (LL3, No.9)
2015 Lexus RC F

3:05.6 (LL2, No.3)
2008 BMW M3 coupe

3:05.4 (LL2, No.4)
2009 BMW M3 coupe

3:05.4 (LL2, No.5)
2011 Lexus IS F

3:05.3 (LL3, No.6)
2012 Lotus Evora S

3:05.2 (LL3, No.7)
2013 BMW M5

3:05.2 (LL2, No.9)
2015 Ford Mustang GT

3:05.0 (LL3, No.4)
2009 Lotus Exige S 260 Sport

3:04.9 (LL3, No.6)
2012 Mercedes-Benz CLS63 AMG

3:04.8 (LL2, No.6)
2012 Audi TT RS

3:04.7 (LL3, No.7)
2013 BMW M6

3:04.6 (LL3, No.2)
2007 Audi R8

3:04.5 (LL3, No.2)
2007 Lotus Exige S

3:04.3 (LL3, No.7)
2013 Audi RS5

3:04.2 (LL3, No.5)
2011 Cadillac CTS-V coupe

3:04.2 (LL3, No.7)
2013 Porsche Boxster S

3:04.0 (LL2, No.3)
2009 Cadillac CTS-V sedan

3:04.0 (LL2, No.5)
2011 Ford Shelby GT500

3:04.0 (LL1, No.10)
2017 Chevrolet Camaro 1LE

3:03.9 (LL3, No.6)
2012 Porsche Cayman R

3:03.9 (LL2, No.10)
2016 Ford Focus RS

3:03.8 (LL3, No.5)
2011 Porsche Boxster Spyder

3:03.6 (LL2, No.2)
2007 Chevrolet Corvette Z51

3:03.5 (LL3, No.10)
2016 Dodge Charger SRT Hellcat

3:03.0 (LL3, No.8)
2014 Audi RS7

3:02.8 (LL2, No.6)
2012 Ford Mustang Boss 302 Laguna Seca

3:02.6 (LL3, No.8)
2014 Porsche Cayman S

3:02.2 (LL4, No.10)
2016 Jaguar F-type Project 7

3:02.1 (LL4, No.7)
2013 Jaguar XKR-S

3:01.9 (LL2, No.10)
2016 BMW M2

3:01.8 (LL3, No.2)
2007 Porsche 911 GT3

3:01.6 (LL3, No.1)
2006 Dodge Viper SRT10 coupe



LIGHTNING LAP NO.10

P/058 . CAR AND DRIVER . OCT/2016

3:01.5 (LL2, No.7)
2013 Chevrolet
Camaro SS 1LE

3:01.2 (LL2, No.3)
2008 Chevrolet
Corvette Z51

3:01.1 (LL3, No.1)
2006 Chevrolet
Corvette Z06

3:01.0 (LL3, No.8)
2015 Jaguar F-type
R coupe

3:00.7 (LL4, No.1)
2006 Ford GT

3:00.7 (LL4, No.6)
2012 Porsche Panamera
Turbo S

3:00.7 (LL3, No.8)
2015 BMW M4

3:00.6 (LL3, No.7)
2013 Ford Shelby
GT500

3:00.1 (LL3, No.8)
2014 Mercedes-Benz
E63 AMG S-model

2:59.8 (LL2, No.9)
2016 Cadillac ATS-V
sedan

2:59.5 (LL4, No.4)
2010 Audi R8 5.2 FSI
Quattro

2:59.2 (LL3, No.9)
2015 Mercedes-AMG
C63 S

2:59.2 (LL3, No.9)
2016 Cadillac ATS-V
coupe

2:59.1 (LL4, No.8)
2014 Jaguar XKR-S GT

2:59.1 (LL4, No.8)
2014 Mercedes-Benz
SL63 AMG

2:59.0 (LL3, No.3)
2009 Nissan GT-R
(all-season tires)

2:58.9 (LL3, No.7)
2013 Porsche 911
Carrera S

2:58.8 (LL2, No.4)
2010 Chevrolet Corvette
Grand Sport

2:58.2 (LL3, No.2)
2007 Chevrolet
Corvette Z06

2:58.0 (LL4, No.5)
2011 Mercedes-Benz
SLS AMG

2:58.0 (LL3, No.7)
2012 Mercedes-Benz
C63 AMG Black Series

2:57.6 (Kit Car, No.4)
2009 Ariel Atom 3

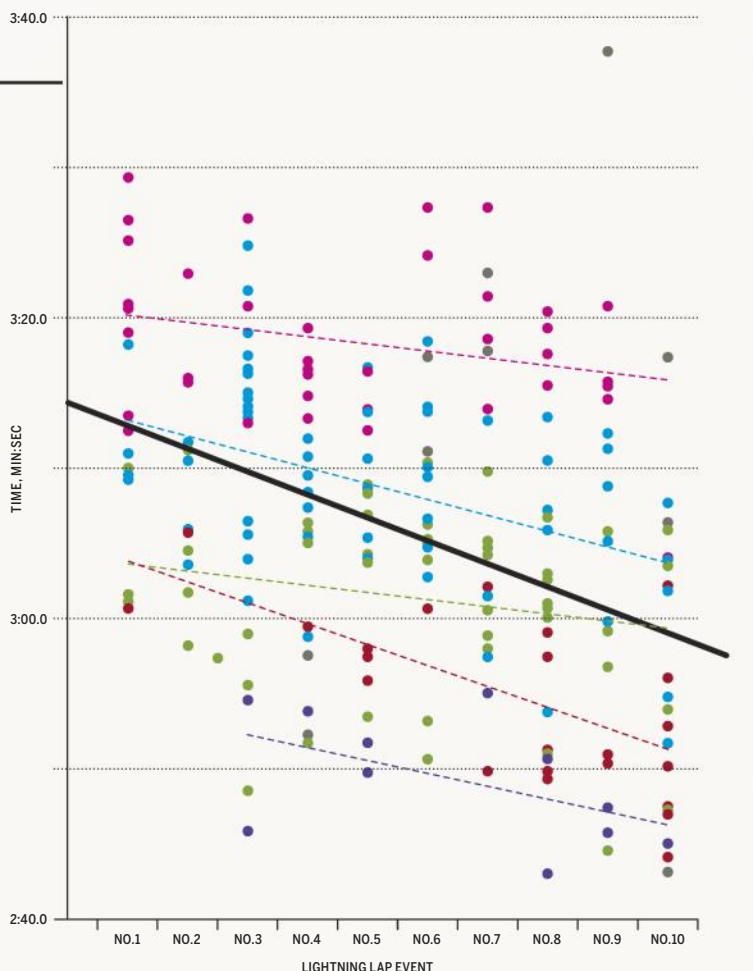
2:57.5 (LL4, No.5)
2011 Porsche 911
Turbo S

CARRY THE 1 AND ...

Negative Slope

Around Grand West, performance cars are getting quicker at a rate of about 1.5 seconds per year. If that pace continues, Lightning Lap No.21 should see a handful of cars lapping quicker than the Porsche 918 Spyder. The LL3 trend actually starts below the pricier LL4 class, but LL4 has improved the most of any class in the last 10 years.

CLASS BREAKDOWN
● LL1 Up to \$34,999
● LL2 \$35,000–\$64,999
● LL3 \$65,000–\$124,999
● LL4 ... \$125,000–\$244,999
● LL5 \$245,000 and above
● OTHERS
— OVERALL TREND
--- CLASS TRENDS



2:57.5 (LL2, No.7)
2013 Chevrolet
Camaro ZL1

2:57.5 (LL4, No.8)
2014 Audi R8 V-10 Plus

2:57.4 (LL3, No.2.5)
2008 Dodge Viper
SRT10

2:56.8 (LL3, No.9)
2016 Cadillac CTS-V

2:56.1 (LL4, No.10)
2017 Audi R8 V-10 Plus

2:55.9 (LL4, No.5)
2011 Porsche 911
GT3 RS

2:55.6 (LL3, No.3)
2009 Nissan GT-R

2:55.1 (LL5, No.7)
2012 Lexus LFA

2:54.8 (LL2, No.10)
2017 Chevrolet Camaro
SS 1LE

2:54.6 (LL5, No.3)
2008 Ferrari 430
Scuderia

2:54.0 (LL3, No.10)
2016 Porsche Cayman
GT4

2:53.9 (LL5, No.4)
2010 Lamborghini
Murciélago LP670-4 SV

2:53.8 (LL2, No.8)
2014 Chevrolet
Corvette Stingray

2:53.5 (LL3, No.5)
2011 Chevrolet
Corvette Z06

2:53.2 (LL3, No.6)
2012 Nissan GT-R

2:52.9 (LL4, No.10)
2016 BMW M4 GTS

2:52.3 (Kit Car, No. 4)
2009 KTM X-Bow

2:51.8 (LL3, No.4)
2009 Chevrolet
Corvette ZR1

2:51.8 (LL5, No.5)
2010 Lamborghini
Gallardo LP570-4
Superleggera

2:51.8 (LL2, No.10)
2016 Ford Mustang
Shelby GT350R

2:51.2 (LL4, No.8)
2014 Porsche 911
Turbo S

2:51.0 (LL4, No.9)
2016 Mercedes-AMG
GT S

2:50.9 (LL3, No.8)
2015 Chevrolet
Camaro Z/28

2:50.8 (LL5, No.8)
2014 Ferrari
F12berlinetta

2:50.7 (LL3, No.6)
2012 Chevrolet
Corvette ZR1

2:50.4 (LL4, No.9)
2015 Porsche 911 GT3

2:50.2 (LL4, No.10)
2017 Acura NSX

2:49.9 (LL4, No.7)
2012 Ferrari 458 Italia

2:49.9 (LL4, No.8)
2014 SRT Viper TA

2:49.8 (LL5, No.5)
2012 Mosler Photon

2:49.4 (LL4, No.8)
2015 Nissan GT-R
NISMO

2:48.6 (LL3, No.3)
2008 Dodge Viper
SRT10 ACR coupe

2:47.5 (LL5, No.9)
2015 Lamborghini
Huracán LP610-4

2:47.4 (LL4, No.10)
2016 McLaren 570S

2:47.1 (LL3, No.10)
2017 Chevrolet Corvette
Grand Sport

2:47.0 (LL4, No.10)
2016 Porsche 911
GT3 RS

2:45.9 (LL5, No.3)
2009 Mosler MT900S

2:45.8 (LL5, No.9)
2015 McLaren 650S
Spider

2:45.1 (LL5, No.10)
2016 Ferrari 488GTB

2:44.6 (LL3, No.9)
2015 Chevrolet
Corvette Z06

2:44.2 (LL4, No.10)
2016 Dodge Viper ACR

2:43.2 (Concept Car,
No.10) 2016 Lexus RC F
GT Concept

2:43.1 (LL5, No.8)
2015 Porsche 918
Spyder



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SUPPORTING YOUR COUNTRY
AND
FELLOW AMERICAN WORKER
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—David MacNeil, Founder & CEO, WeatherTech®

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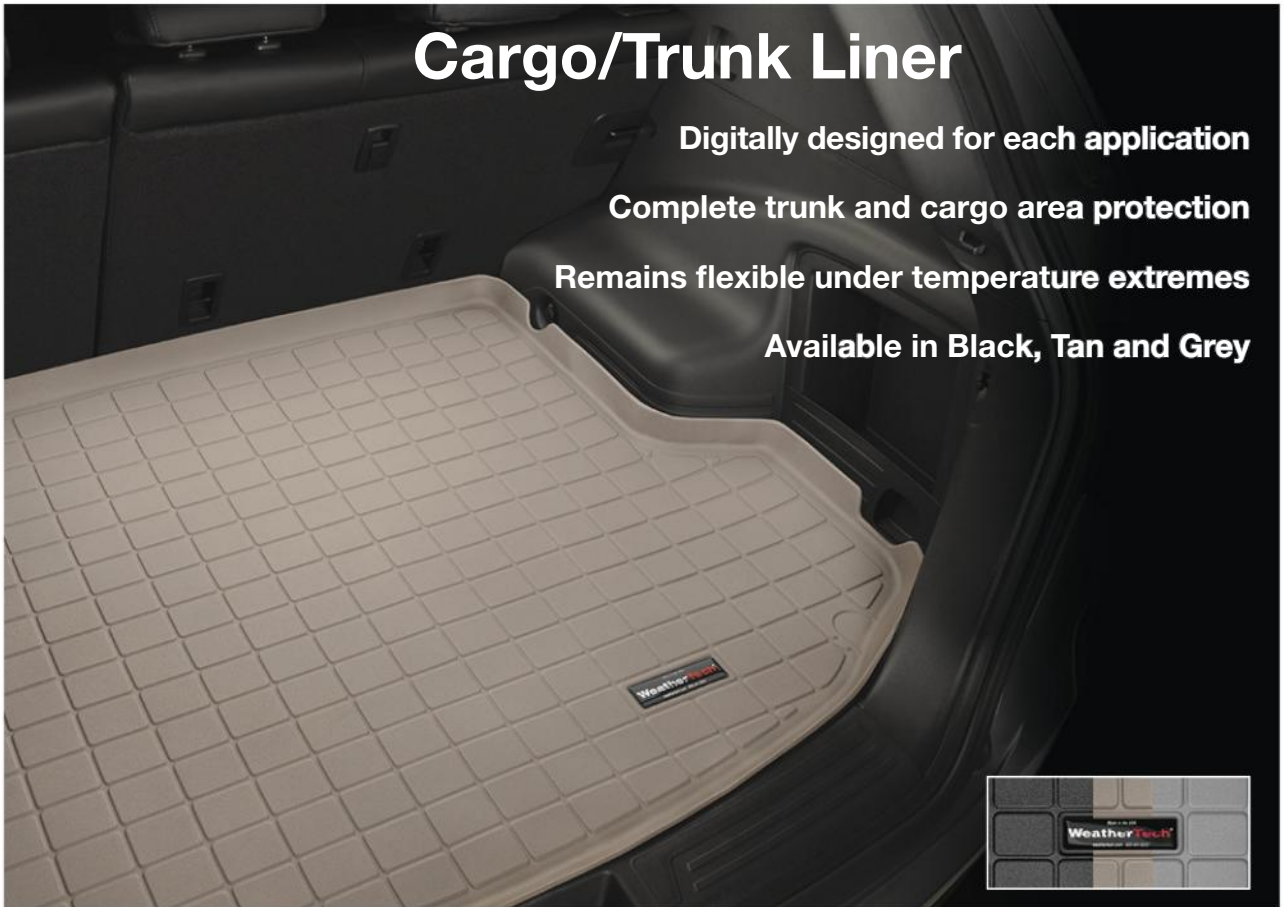
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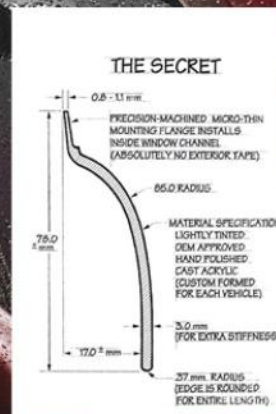
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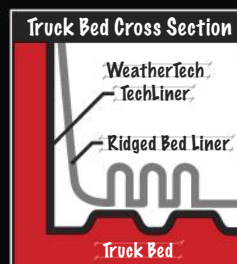
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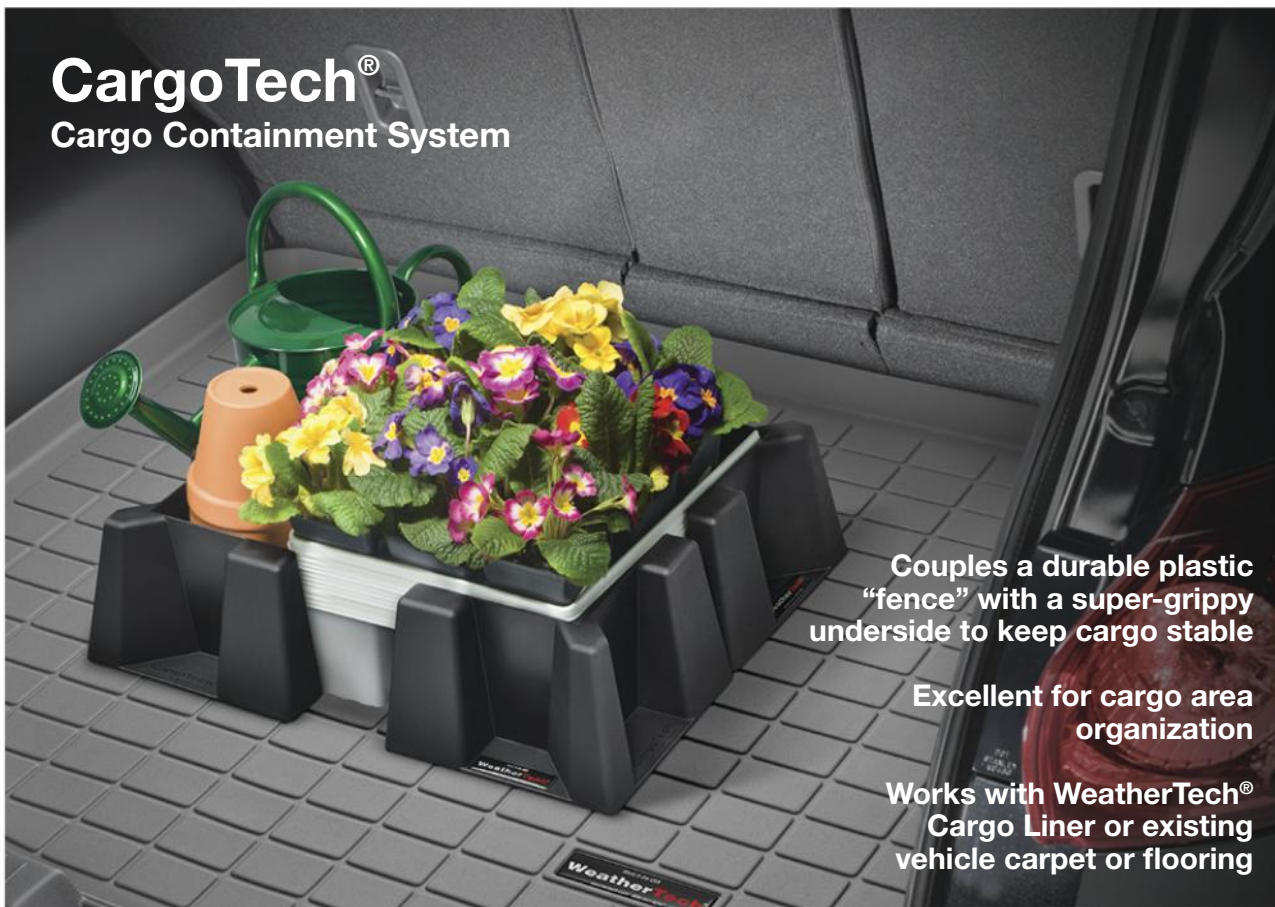
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O

2017 Honda Ridgeline



WE HUSTLE THE
REDESIGNED
RIDGELINE ACROSS
THE BORDER
TO THE GREAT
WHITE NORTH.
IS THE HONDA AN
ESCAPE FROM
DOMESTIC-TRUCK
CONVENTION
OR AN EMBRACE
OF PICKUP
PROVINCIALISM?

_by Jeff Sabatini



_photography by Roy Ritchie

NADA



As any erstwhile Bernie Bro will happily mansplain to you, Canada is already the superior nation to our own, which is why moving there is the only reasonable course of action once President Trump turns the White House into a casino resort with 36-hole mini-golf on the front lawn. Canadians have socialized medicine, lower rates of gun violence, and even a new carbon pricing initiative.

And no pennies.

That's right; as of February 4, 2013, the Royal Canadian Mint stopped distributing the useless little pocket weights as part of Canada's Economic Action Plan 2012. So when you pay cash for your hockey gear at Canadian Tire, the cashier will just round your purchase to the closest nickel. Indeed, Canada really is a land of clever ideas! And its proximity—the border lies just 45 miles from our office—made it the perfect

location to drive the new-for-2017 Honda Ridgeline. Here, in the shadow of General Motors' headquarters, we would discern whether this unibody truck might, ahem, trump the American body-on-frame paradigm.

You will remember that the original Ridgeline, which was too clever by half, went out of production after the 2014 model year. Its major defect was that it looked weird, with origami-like buttresses that extended from the cab to the bedsides. So the new Ridgeline is now indistinguishable from a pickup truck. Or a pickup-truck emoji. Or one of those genericized toy pickup trucks that you give to your infant son to get an early jump on reinforcing prevailing gender stereotypes. But it's definitely nothing like the first-generation Ridgeline.

Similarly, on the surface, Canada doesn't look all that different from the United States. Emerging from the Detroit-Windsor Tunnel with morning rising out of the southeastern sky, we find



[+] DRIVES LIKE AN ACCORD, QUIETER THAN A MERCEDES, FULL OF CLEVER FEATURES. [-] INFORMATION SYSTEM NEEDS REAL BUTTONS, WIMPY TOW RATING, CONVENTIONAL LOOKS ARE TOO CONVENTIONAL. [=] A TRUCK FOR PEOPLE WITHOUT REASON TO BUY ONE.

things seem pretty much the same as on our side of the Detroit River. Which, confusingly enough, is actually to the north. But squinting against the sun, we spot the first clue that we're in a foreign land: The cute little maple leaf in the center of McDonald's Golden Arches. Spending the day driving around Ontario in the Ridgeline, we notice more signs, like ones with metric speed limits, confounding in that they make you feel as if you are going fast but also slow at the same time. Did you know that Canada has 100 percent more signs written in French than the U.S., and 100 percent fewer in Spanish? And that in Canada, old, sunbaked Dodge Intrepids are Chrysler Intrepids, though no less old and sunbaked?

Under our new Ridgeline's conservative (no exposed exhaust pipes, natch) but not-at-all sunbaked skin is a platform once again shared with the Pilot and the next Odyssey, but beefed up for truck duty, with its 125.2-inch wheelbase extended by 14.2 inches over the three-row crossover and 3.2 inches beyond that of the original Ridgeline. The truck still features a composite and nigh-on indestructible bed with a lockable trunk and a two-way tailgate that can fold down as well as swing open. Only now, the bed can be turned into a giant speaker by virtue of Honda's Truck Bed Audio system that uses small electric actuators to vibrate the panels so you can blast Rush in the parking lot before the next Argos game.



If the actual Ridgeline won't have any problem being heard, it remains to be seen whether the pitch for this carlike truck will again fall on deaf ears. We would argue that truck buyers should listen, because there is no more civilized truck extant. The Ridgeline drives like an Accord, meaning better than any other pickup, from heavy-duty models to full-sizers to whatever we're calling the smallish trucks that form the Ridgeline's would-be competitive set.

That would include the Toyota Tacoma, the Nissan Frontier, and the Chevrolet Colorado/GMC Canyon twins, trucks more alike than different. None of these dominant players much resembles the Ridgeline beyond exterior appearances (i.e., they are all trucks). The Ridgeline is shorter, but at 210 inches long and weighing 4423 pounds, the "compact" label no longer fits. The industry refers to them as mid-size trucks, but we might better dredge up that old term "intermediate." The Ridgeline still tows only 5000 pounds, 1400 to 2000 pounds less than the others, which really just points out that intermediates are not well suited for serious towing.

The Ridgeline uses front struts and a multilink rear suspension tuned on the firm side, but passenger-car firm rather than truck firm. Compared with body-on-frame trucks with solid rear axles, this one rides like a memory-foam mattress pad atop a bed of sea sponges. And compared with its Pilot sibling, the Ridgeline is a dream. If you want proof that the pickup has truck parts and not wimpy minivan underpinnings, you need only drive them back to back. It feels as if Honda torqued down all the nuts in the Ridgeline by an extra 20 foot-pounds. The body leans and rolls little and hardly transmits small bumps, while larger impacts deal only initial jolts, the secondary motions stopped dead. The electrically assisted steering has good on-center feel, but it's light and distant. At least it's quick enough to make the Ridgeline nimble, and we pulled a strong 0.80 g on our skidpad, which is not a trucklike number.

Also not like a truck: The Ridgeline is quiet, its optional laminated windshield helping to produce a lower decibel reading in the cabin than in a Mercedes S-class, both at idle and at freeway-cruising speed. At full throttle, the 3.5-liter Honda V-6 gets louder, though as you close in on the 6750-rpm redline it starts sounding like a Vita-mix. As we said, not like a truck.

The single-overhead-cam engine in the Ridgeline now makes 280 horsepower and 262 pound-feet of torque, the 30 extra ponies and 15 more pound-feet coming in part from direct injection and a higher compression ratio than in the old truck. And no, this is not a detuned Acura NSX motor; that 3.5-liter V-6 has twice as many camshafts and a 75-degree vee angle. The Ridgeline is not an NSX,



Above middle: The watertight in-bed trunk accommodates the contents of a Molson suitcase. Above: The infotainment system is not as accommodating.

but it is quicker than its competition, with 60 mph coming in just 6.6 seconds, a half-second ahead of the quickest V-6 Colorado we've tested, despite the Chevy having 305 horsepower.

Throttle response in the Ridgeline is perfect, with none of the calibrated-for-fuel-economy electronic lag that some modern vehicles exhibit. That is, as long as you don't press the green "econ" button to the left of the steering wheel. We didn't, yet we still averaged 21 mpg, matching the EPA combined rating. The Ridgeline's six-speed transmission consistently shifts for power and performance, never straying more than a gear away from the powerband and kicking down with an immediacy that shames the Pilot's optional nine-speed, which hunts for gears as if it's brandishing a rifle and an Ontario Outdoors Card.

Like the Pilot's, the Ridgeline's all-wheel-drive system (standard on our test truck) has a variety of terrain modes that affect how torque is routed to the rear wheels, though, like most owners, our off-pavement forays included nothing more challenging than a gravel driveway.

The brakes are the least impressive part of the Ridgeline's mechanical package. We recorded a competitive 195-foot stopping distance from 70 mph, but the pedal has

the Pilot's soft initial bite and too much travel. The carlike feel of the brakes matched to the trucklike braking performance meant we often found ourselves having to apply extra pressure to "catch up" while slowing down, thus narrowly avoiding an inadvertent redesign of the Ridgeline's bland front fascia when a truck suddenly swerved into the Beer Store ahead of us.

It was at this hallmark of Canadian good ideas that we set out to test Honda's good ideas regarding hauling stuff. For those unfamiliar with the Beer Store, this is Ontario's way of eliminating that uncertainty over whether the gas station on the corner sells beer or that convenience store down the street has nice cold ones. Because up until December 2015, the Beer Store was the only place to buy beer (you can now pick up a six-pack at select grocery stores).



Top right: Instead of using black bars to obscure identity, we prefer the 28-pack. Bottom right: Flip the rear seat, and voilà!—more beer storage.

Fear of the customs officer had us stashing our 28-bottle case of Molson Canadian in the in-bed trunk for our return trip. But not before we noticed that the Ridgeline's bed is rather shallow at only 18 inches deep compared with 20.9 in the Colorado. That's the price you pay for the independent rear suspension. And the trunk, which we realized would cost hundreds of dollars to fill with ice only to have it all melt before we got home, is not actually a cooler but an uninsulated plastic bin, one that smells like a Chevy Corvette (it's the plastic). Also: You can't access the trunk when you've loaded something large into the bed, as your payload then blocks the lift-up lid. Still, the trunk is watertight and has a convenient drain plug.

The Ridgeline's cab is pretty much taken right from the Pilot, and it's something Honda got more than right, with cubbies and bins and cupholders, four USB ports, and a vast center-console compartment. And it's no deer-camp experience—the cockpit and seats are spa-vacation comfortable and our test truck even had three-zone

climate control. The same thinking carries into the Ridgeline's cavernous rear compartment, which can seat three adults or provide an enormous enclosed cargo hold with the split seat bottoms folded up. A shame then that the Ridgeline's rear doors don't open quite as wide as they should.

If the Ridgeline has one glaring fault, it's the infotainment system. Coincidentally, we found that the Beer Store also suffers from being overcomplicated with technology. Rather than its wares being on display behind refrigerated glass doors, most of the inventory beyond a few racks of best sellers is kept back in the cooler. Up front, touchscreen menus with real-time inventory are set up to peruse. Browsing the inventory this way just felt too much like work and didn't produce the appropriate salivating effect of ice-cold bottles glistening with perspiration. A dearth of physical buttons to control

2017 HONDA RIDGELINE BLACK EDITION

PRICE
AS TESTED **\$43,770**
BASE \$43,770

VEHICLE TYPE: front-engine, all-wheel-drive, 5-passenger, 4-door pickup
OPTIONS: none
AUDIO SYSTEM: satellite radio; minijack, 4 USB, and Bluetooth-audio inputs; Android Auto and Apple CarPlay interfaces; 8 speakers

ENGINE
V-6, aluminum block and heads
BORE X STROKE 3.50 x 3.66 in, 89.0 x 93.0 mm
DISPLACEMENT 212 cu in, 3471 cc
COMPRESSION RATIO 11.5:1
FUEL DELIVERY SYSTEM: direct injection
VALVE GEAR: single overhead cam, 4 valves per cylinder, variable intake-valve timing and lift
REDLINE/FUEL CUTOFF 6750/6500 rpm
POWER 280 hp @ 6000 rpm
TORQUE 262 lb-ft @ 4700 rpm

DRIVETRAIN
TRANSMISSION: 6-speed automatic
FINAL-DRIVE RATIO 4.25:1
ALL-WHEEL-DRIVE SYSTEM: full-time with twin rear-axle clutch-pack couplings

GEAR	RATIO	MPH PER 1000 RPM	MAX SPEED IN GEAR (rpm)
1	3.36	6.0	39 mph (6500)
2	2.10	9.5	62 mph (6500)
3	1.49	13.5	88 mph (6500)
4	1.07	18.7	112 mph (6000)
5	0.75	26.7	112 mph (4200)
6	0.56	35.8	112 mph (3150)

CHASSIS
unit construction with 2 rubber-isolated subframes
BODY MATERIAL: steel and aluminum stampings

STEERING
rack-and-pinion with variable electric power assist
RATIO 15.6:1
URNS LOCK-TO-LOCK 3.0
TURNING CIRCLE CURB-TO-CURB 44.4 ft

SUSPENSION
F: ind, strut located by a control arm, coil springs, anti-roll bar
R: ind; 1 control arm, 2 diagonal links, and a toe-control link per side; coil springs; anti-roll bar

BRAKES
F: 12.6 x 1.1-in vented disc, 2-piston sliding caliper
R: 13.0 x 0.4-in disc, 1-piston sliding caliper
STABILITY CONTROL partially defeatable

WHEELS AND TIRES
WHEEL SIZE 8.0 x 18 in
WHEEL CONSTRUCTION cast aluminum
TIRES Firestone Destination LE 2 245/60R-18 105H M+S

EXTERIOR DIMENSIONS	
WHEELBASE	125.2 in
LENGTH	210.0 in
WIDTH	78.6 in
HEIGHT	70.8 in
FRONT TRACK	66.1 in
REAR TRACK	66.0 in
GROUND CLEARANCE	7.9 in

INTERIOR DIMENSIONS
SAE VOLUME F: 58 cu ft R: 51 cu ft
UNDER-BED TRUNK 7 cu ft

CAR AND DRIVER TEST RESULTS

ACCELERATION	SECONDS
ZERO TO	
30 MPH	2.5
40 MPH	3.6
50 MPH	5.0
60 MPH	6.6
70 MPH	8.6
80 MPH	10.8
90 MPH	13.9
100 MPH	17.9
110 MPH	23.5
ROLLING START, 5-60 MPH	6.9
TOP GEAR, 30-50 MPH	4.0
TOP GEAR, 50-70 MPH	5.0
1/4-MILE	15.2 sec @ 93 mph
TOP SPEED (GOV LTD)	112 mph

the Ridgeline's infotainment system meant we often found ourselves pressing the wrong part of the screen or hitting the same area of the screen twice, producing the opposite effect intended. Like trying to turn the radio off for our Border Patrol interrogation only to accidentally switch it back on, earning a scornful glare and causing our own bout of perspiration.

How long before the guys at the tunnel get clued in to the Ridgeline's built-in smuggling compartment? That will likely depend on whether American truck buyers recognize the cunning behind the new Ridgeline. Honda's reputation for doing things differently and better was not much bolstered by the first one, though it should have been. And it should be this time, too, though we imagine most Ridgeline buyers will be among the few who already save for retirement, have good dental insurance, and voluntarily get vasectomies.

If you don't tow much more than a pop-up and you aren't going to do any serious off-roading, the Ridgeline is for you. And make no mistake, this describes most truck owners. Anyone still buying one of the other intermediate—or even full-size—trucks: You owe it to yourself to take a long look in the mirror and contemplate how much of your purchase decision is influenced by the desire to project a tough image. To paraphrase singer Geddy Lee and satirists Bob and Doug McKenzie, esteemed Canadians all, if you choose not to decide to buy a Ridgeline, you still have made a choice, hoser. ■



Explained: The Buttrass and the Box

The original Ridgeline's sloping buttresses weren't a styling edict or a structural requirement. They were dictated by a basic Honda manufacturing tenet, which requires standardized build processes to the extent that any of the company's final-assembly plants can build any Honda vehicle with minimal reconfiguration. One of the key commonalities (and universal to virtually all unibody construction) is the use of a single body-side panel from A-pillar to taillight. The 135-degree angle defining where the buttress met the top of the bed was as close as Honda could get to an L shape with a single panel and still ensure its quality.

For the second-generation truck, engineers were forced to alter their approach when Honda decided to stretch the bed length by four inches. The previous body side, already the largest stamping Honda produced, was so long that the die extended beyond the press, and the manufacturing experts weren't willing to move farther beyond the tool's dimensions. Instead, the new Ridgeline uses a bolt-on rear fender that allows for a more traditional cab-and-bed look. The unibody chassis hides beneath the skin with a stamped steel truss-like structure in the bedsides that is welded and bonded to the cab's C-pillar. The Ridgeline's unique rear fender now integrates into Honda's manufacturing process. In the Lincoln, Alabama, assembly plant where the Ridgeline is built, the addition of the rear-fender-installation cell offers the opportunity for additional welding or structural adhesive application on future models. —Eric Tingwall

HANDLING

ROADHOLDING, 300-FT-DIA SKIDPAD 0.80 g
UNDERSTEER MODERATE

BRAKING, 70-TO-ZERO MPH

SHORTEST STOP 195 ft
LONGEST STOP 208 ft
FADE RATING MODERATE

WEIGHT

CURB 4423 lb
PER HORSEPOWER 15.8 lb
DISTRIBUTION F: 56.9% R: 43.1%
CENTER-OF-GRAVITY HEIGHT 28.0 in
TOWING CAPACITY 5000 lb

FUEL

CAPACITY 19.5 gal
OCTANE 87
EPA COMBINED/CITY/HWY 21/18/25 mpg
C/D OBSERVED 21 mpg

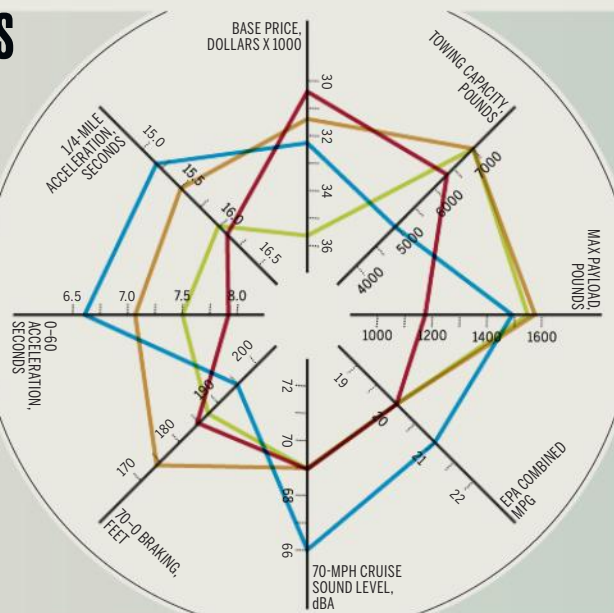
INTERIOR SOUND LEVEL

IDLE 37 dBA
FULL THROTTLE 77 dBA
70-MPH CRUISING 66 dBA

COMPETITORS

The Ridgeline can't tow as much as other mid-size trucks, but it knows how to haul ass when unburdened.

■ **CHEVROLET COLORADO 4X4 CREW CAB**
3.6-L V-6, 6-SP AUTO, 305 HP
■ **GMC CANYON 4X4 CREW CAB**
3.6-L V-6, 6-SP AUTO, 305 HP
■ **HONDA RIDGELINE AWD**
3.5-L V-6, 6-SP AUTO, 280 HP
■ **TOYOTA TACOMA 4X4 DOUBLE CAB**
3.5-L V-6, 6-SP AUTO, 278 HP



VOYAGER TO THE PACIFICA

Chrysler's revolutionary 1984
minivan casts a spell on
the evolutionary 2017 Pacifica.

—by John Pearley Huffman

—photography by Marc Urbano



▲
1984 PLYMOUTH VOYAGER LE

Price: \$32,834* • Power: 99 hp
Torque: 143 lb-ft • Weight: 3400 lb
C/D observed: 20 mpg
*Adjusted for inflation

▲
2017 CHRYSLER PACIFICA LIMITED

Price: \$49,450 • Power: 287 hp
Torque: 262 lb-ft • Weight: 4557 lb
C/D observed: 20 mpg

There was a *Ghostbusters* movie in 1984, and there's one this year. *Game of Thrones* is really just *Falcon Crest* with more dragons and beheadings. The Libertarians didn't stand a chance then and don't now. Just look at these two seven-seat minivans, both driving out of Chrysler's Windsor, Ontario, assembly plant and into the North American zeitgeist. They're completely different vans, and yet exactly the same. It's a mind-blowing paradox.

The old one is Magic Wagon No. 1, the actual preproduction 1984 Plymouth Voyager that Chrysler's then CEO, Lee Iacocca, used at press unveilings, dealer meetings, and general cheerleading sessions to drum up enthusiasm for the new "T115" minivans. Stray badges shoved into a rear cubby indicate that it sometimes also appeared as a Dodge Caravan. There are about 12,000 miles on the clock, and fake wood forests the sides. A lot of corduroy cows died to upholster those seats.

The new one is a 2017 Chrysler Pacifica, the state of the art in a vehicle category that's notoriously artless. It has command thrones up front, second-row seats that disappear into the floor, third-row seating that drops into a deep well, and hides from real cows to cover them all. If the glass sunroof were any more panoramic it would have to be continued on the next van.



PRICE AS TESTED
BASE PRICE

2017 CHRYSLER
PACIFICA LIMITED

\$49,450

\$43,490

1984 PLYMOUTH
VOYAGER LE*

\$32,834[†]

\$22,025[†]

DIMENSIONS

LENGTH
WIDTH
HEIGHT
WHEELBASE
FRONT TRACK
REAR TRACK
INTERIOR VOLUME

203.8 in
79.6 in
69.9 in
121.6 in
68.3 in
68.3 in
F: 58 cu ft
M: 54 cu ft
R: 47 cu ft

175.9 in
69.6 in
64.2 in
112.0 in
59.9 in
62.1 in
F: 50 cu ft
M: 43 cu ft
R: 42 cu ft

CARGO BEHIND
FRONT SEATS

141 cu ft

125 cu ft

POWERTRAIN
ENGINE

DOHC 24-valve V-6
220 cu in (3605 cc)

SOHC 8-valve
inline-4
156 cu in (2555 cc)

POWER HP @ RPM
TORQUE LB-FT @ RPM
REDLINE/FUEL CUTOFF
LB PER HP

287 @ 6400
262 @ 4000
none/6500 rpm
15.9

99 @ 4800
143 @ 2000
none/5000 rpm
34.3

DRIVELINE

TRANSMISSION
DRIVEN WHEELS
GEAR RATIO:1/
MPH PER 1000 RPM/
MAX MPH

9-speed automatic
front
1 4.70/4.8/31
2 2.84/7.9/51
3 1.91/11.8/77
4 1.38/16.3/106
5 1.00/22.6/112
6 0.81/27.9/112
7 0.70/32.2/112
8 0.58/38.9/112
9 0.48/47.0/112

3-speed automatic
front
1 2.69/8.4/42
2 1.55/14.7/74
3 1.00/22.7/94

AXLE RATIO:1

3.25

3.22

CHASSIS
SUSPENSION

F: struts, coil
springs, anti-roll bar
R: multilink, coil
springs

F: struts, coil
springs, anti-roll bar
R: rigid axle, leaf
springs

BRAKES

F: 13.0-inch vented
disc
R: 13.0-inch disc

F: 10.2-inch vented
disc
R: 9.0-inch drum

STABILITY CONTROL
TIRES

traction off
Falken
Ziex CT50 A/S
245/50R-20 102V M+S

none
Goodyear
Vector
P195/75R-14 M+S

CAR AND DRIVER TEST RESULTS

ACCELERATION

0-30 MPH
0-60 MPH
0-80 MPH
0-100 MPH
1/4-MILE @ MPH

2.7 sec
7.3 sec
12.5 sec
20.2 sec
15.8 sec @ 91

4.4 sec
14.0 sec
27.0 sec
—
19.5 sec @ 71

ROLLING START,
5-60 MPH
TOP GEAR, 30-50 MPH
TOP GEAR, 50-70 MPH
TOP SPEED

7.9 sec
4.3 sec
5.6 sec
112 mph (gov ltd)

—
6.1 sec
10.1 sec
94 mph (drag ltd)

CHASSIS

BRAKING, 70-0 MPH
ROADHOLDING,
300-FT-DIA SKIDPAD

177 ft
0.83 g[‡]

256 ft
0.68 g

WEIGHT

CURB
%FRONT/%REAR

4557 lb
55.1/44.9

3400 lb
57.9/42.1

FUEL

TANK
RATING
EPA COMBINED/
CITY/HWY
C/D OBSERVED

19.0 gal
87 octane
22/18/28 mpg
20 mpg

20.0 gal
87 octane
18/17/20 mpg
20 mpg

SOUND LEVEL

IDLE
FULL THROTTLE
70-MPH CRUISE

38 dBA
76 dBA
69 dBA

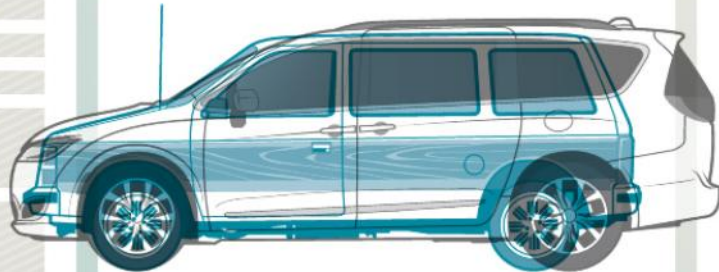
50 dBA
74 dBA
71 dBA

Pacifica tested by K.C. COLWELL in Chelsea, MI
Voyager tested by CSABA CSERE in Irvine, CA

*April 1984 road-test results †Adjusted for inflation ‡Stability-control inhibited

They grow up so fast.

The Pacifica dwarfs the original minivan. But it's also longer than the long-wheelbase version of the full-size 1984 Dodge Ram Van. And its V-6 makes 152 more horsepower than the Ram Van's optional V-8.



The front-drive minivan was a Hail Mary pass thrown up by a team ready to be shoved out of the league. The K-car's success had given Chrysler just enough freedom to take a big chance on reinventing family transportation. If it worked, the company would pay off its government-guaranteed loans and proceed onward to prosperity under Iacocca's enlightened whip. If the minivan turned out to be a sales turd, well, Chrysler was going bankrupt anyhow. The company couldn't afford the extra paper to write down a Plan B.

Chrysler's timing was perfect. The minivan appeared just as baby boomers hit optimal fertility and their contempt for station wagons peaked. In contrast to the massive acreage of a Country Grand Safari Estate Cruiser, the minivan was adorably dorky; a friendly module that fit in garages, nimbly slalomed through parking lots, and had a big door on the side through which to throw toddlers. It did everything a mom-mobile had to do, but more efficiently and without the crushing wagon shame.



Change is inevitable, though, and the generation that grew up in minivans is now in its own stage of prime progeny creation. And they've largely stigmatized the minivan as the official shuttle between home and Blue Field No. 4 hell. So crossovers rule, even though the minivan has evolved into a vastly capable suburban multi-tool.

Is this a specious comparison? Is it polluted with nostalgia, addled with spurious allusions, and basically absurd? Damn straight. But we couldn't find a first-gen Porsche 911 with which to do that car-magazine cliché thing, comparing the old one against the new one, so we figured this would be just as good. Plus, driving these two back to back proved oddly enlightening, even though we couldn't take the oldster past 45 mph on a loop at Chrysler's Chelsea, Michigan, proving grounds. Of course the new van is better. It's also worse. So?

2. 1984 Plymouth Voyager LE

First-generation Chrysler minivans are nearly extinct. The few listed on eBay or Craigslist are basket cases selling for three figures. Ferraris are more common on the road. And virtually all the minivans that clogged the parking lots at Circuit City and Montgomery Ward were long ago recycled into Chinese rebar. So driving this pristine one, literally pulled from the Chrysler museum for *C/D*'s amusement, is rare air. Maybe even, almost, this close to exciting.

Every square millimeter of the Voyager is useful, and square is how it's designed. The pillars are straight edges, the interior surfaces flat, and the seats bolt-upright. Even almost 33 years after its debut, the sheer compact logic of this boxy design is astonishing. Heather Thomas had the curves, not Chrysler.

Inside the box, it's all black and brown tones with squishy, soft-but-comfortable front buckets and two rows of benches all finished in a crosshatch ribbed fuzz that may be coming back into fashion. The instrumentation, switches, column-mounted shifter, and steering wheel are all bits swiped from the K-car. It not only is roomy, it feels roomy. There's loads of glass and not even a glovebox to intrude on the front passenger's kneeroom. A pull-out drawer under that passenger's seat provides storage.

The front windows can be manually cranked down, but the side windows behind only swing out about an inch for ventilation. There are three ashtrays because even the kids in back should have a spot to snuff out their butts. Cupholders, a breakthrough innovation in the early '80s, are molded into the side panels in back. There are also two mysterious molded rings atop the radio's dash housing that suggest cupholders but are useless. Like everything in the Voyager, the single muscle-powered sliding side door operates with a light touch. But there's no stop to hold it in the open position. That technology was in the far-off future.

Handsome though it is, the Voyager's fuzzy upholstery generated dangerous levels of static electricity while we were wearing our Coca-Cola rugby shirt.

Iacocca's Voyager has the standard 2.2-liter overhead-cam, eight-valve, four-cylinder engine lashed to a three-speed automatic transaxle. Barely gasping through a two-barrel carburetor, the 2.2 was rated at 101 horsepower. Of course it was slow—scary

1984 Plymouth Voyager LE
[+] Brilliantly packaged, still good-looking, mechanically engaging.
[-] Floppy structure, arbitrary ride motions, practically no power.
[=] Hey, Terms of Endearment won the best picture Oscar for 1984 and no one cares about that now, either.

slow. *C/D* drove a Voyager powered by the optional Mitsubishi-made, 99-hp 2.6-liter four, and it slogged to 60 mph in 14.0 seconds and through the quarter-mile in 19.5 seconds at 71 mph. The 2.2 should run within a couple tenths of those performances.

But moms aren't racers, and the headline feature was front-wheel drive, which allowed a flat floor. It was a sharp contrast to the convoluted floorplans of conventional station wagons that made accommodating many loads difficult and segregated passengers in their own holes.

It's best to let the thin, plastic steering wheel dance along under your fingers. The hydraulic power steering isn't quick or communicative, and the 205-section Goodyear whitewalls on 14-inch wheels (185s were standard in '84) don't have much to report back anyhow. The ride from the front MacPherson struts is comfortable enough while a solid axle on leaf springs keeps things jiggly in back. Plenty of rattles





and tremors ripple through the structure even on seemingly smooth roads, and both were present in *C/D*'s first test three decades ago, too. This is a lightly built vehicle, and it feels it, with a curb weight under 3400 pounds.

Such lightness is practically a novelty in the 21st century, and would make the Voyager compelling even if it weren't a childhood artifact. It's a reminder that progress often comes at some cost. The five-passenger Voyager started at \$9075 in 1984, which translates to \$21,053 in 2016 dollars. Throw a load of options on a seven-passenger model, and the price crested over \$14,000—about \$32,834 today. But roll-up windows aren't even an option on the Pacifica.

There were tough choices to be made in 1984. For God's sake, *Knight Rider* and *Hardcastle and McCormick* were on at the exact same time on Sunday nights. And only rich people had VCRs. But choosing to buy a Chrysler minivan over the era's wallowing wagons? That was easy.

1. 2017 Chrysler Pacifica Limited

Compared with the raw old Voyager, the Pacifica Limited is a sensory deprivation chamber. It's quiet, composed, easygoing, and thick in all the places where the Voyager is thin. Yeah, all the radar-based this, HDMI-fed that, and USB-whatever would be pure Cybotron Techno City fantasy to 1984 eyes and ears, but it's the Pacifica's structure and substance that are most impressive.

The Pacifica is 27.9 inches longer, 10.0 inches wider, and 5.4 inches taller than the original Voyager. It's a 4557-pound behemoth that feels every inch of its size, every ounce of its weight, and every dollar of its \$49,450 as-tested price. Somewhere along the evolution of Chrysler's minivan, the mini part was assassinated.

Inside this new van, Chrysler has produced a cabin that feels as if it should have wings and jet engines attached to it. But its

The Pacifica has more transmission gears than it has engine cylinders or seating positions. Also, it can stop from 70 mph before hitting things.



FINAL RESULTS

Shell
**V-Power
NITRO+**
Premium Gasoline
The Official Fuel of
CAR AND DRIVER

1984 PLYMOUTH VOYAGER LE
2017 CHRYSLER PACIFICA LTD
Maximum points available

RANK

1

2

VEHICLE

DRIVER COMFORT	10	9	8
ERGONOMICS	10	8	8
SECOND-ROW COMFORT	5	5	5
SECOND-ROW SPACE*	5	5	3
THIRD-ROW COMFORT	5	5	5
THIRD-ROW SPACE*	5	5	2
CARGO SPACE*	5	5	3
FEATURES/AMENITIES*	10	10	1
FIT AND FINISH	10	8	6
INTERIOR STYLING	10	8	10
EXTERIOR STYLING	10	8	8
REBATES/EXTRAS*	5	1	0
AS-TESTED PRICE*	20	10	20
SUBTOTAL	110	87	79

POWERTRAIN

1/4-MILE ACCELERATION*	20	20	8
FUEL ECONOMY*	10	10	10
ENGINE NVH	10	9	6
TRANSMISSION	10	8	6
SUBTOTAL	50	47	30

CHASSIS

PERFORMANCE*	20	20	10
STEERING FEEL	10	8	8
BRAKE FEEL	10	8	6
HANDLING	10	9	6
RIDE	10	10	7
SUBTOTAL	60	55	37

EXPERIENCE

FUN TO DRIVE	25	15	20
--------------	----	----	----

TOTAL 245 **204** **166**

*These objective scores are calculated from the vehicle's dimensions, capacities, rebates and extras, and/or test results.



most impressive trick is still the now-standard Stow 'n Go second-row seats that fold into wells beneath the floor. Combined with the foldaway third-row bench, flattening the floor of the Pacifica takes about as much time as it does to release one seat latch on the Voyager's removable benches. Once you do, you'll have 141 cubic feet in which to reenact a *Star Wars* light-saber fight from either *A New Hope* or *The Force Awakens*.

What road noise isn't blocked out of the Pacifica by its impressive new steel structure is reduced by its active noise-cancellation system. Meanwhile, the weight saved by the aluminum control arms on the strut-front suspension is likely obliterated by the weight of the optional 20-inch aluminum wheels and 245/50R-20 tires. And yes, there's a vacuum cleaner mounted amidships in the Limited to attack the family debris field. It sucks.

2017 Chrysler Pacifica Limited
[+] Refined, powerful, good-looking, carries a mind-boggling feature set.
[-] Dopey transmission, remote driving experience, the rear-hatch opening is actually smaller than the Voyager's.
[=] It's 1980s science fiction made real.

While a plug-in-hybrid Pacifica is coming soon, currently the only powertrain offered is the familiar 3.6-liter Pentastar V-6 feeding Chrysler's now-ubiquitous nine-speed automatic transaxle. With 287 horsepower aboard, it takes the Pacifica a scant 7.3 seconds to reach 60 mph, or about half the time the Voyager needs. And it hits the quarter-mile mark nearly four seconds before the Voyager gets there. Despite all that, it betters the Voyager's EPA-rated 17-mpg city fuel economy by 1 mpg, and its 28-mpg highway rating is a full 8 mpg better than its ancient ancestor's, even with the 1984 figures updated to today's more conservative ratings.

But the newer transmission is sort of slow and stupid. It takes its time deciding exactly which cog to choose from its smorgasbord of gears, and if you do something unexpected with the throttle, the transmission sometimes can't keep up and hangs there inert. During cruises, it will randomly try various gears, apparently out of pure whimsy.

The T115 evolved into today's Pacifica through a series of incremental steps, most of which couldn't have been predicted 32 years ago. But as refined as this new van is, it's missing the direct mechanical engagement of its ancestor. It needs a touch more *Dukes of Hazzard* and a little less *Airwolf*. ■

Long-Term Test: When the tires get worn and the factory warranty runs out, that's where we come in. *Car and Driver* is your source for the 40,000-mile evaluation.

2015 MAZDA 3

**Arrival: Jan/2015
Departure: Jul/2016**

The top-of-the-line version of Mazda's entry-level car is outsized excellence on a miniature scale. *—by Jared Gall*

Mazda is an unusual car company. Its engineers just spent eight years developing a system called G-Vec-toring Control that effectively trail-brakes for the driver, ever-so-slightly cutting engine torque on corner entry to transfer load onto the front wheels, thereby improving steering response. They hope and expect that nobody will notice. When developing its new CX-9 crossover, Mazda made the smart decision on behalf of its buyers to install a turbocharged four instead of a V-6. Then it optimized that engine for the user profile of large-cross-over buyers, sacrificing power at the top end—where few three-row pilots/parents will ever venture—for the low-end torque they'll use in daily commuting.

Our long-term Mazda 3 predates G-Vec-toring Control, and the car was powered by

Rants & Raves

"The calm, smooth quiet of the powertrain at freeway speeds is in the same league as that of a luxury car."

—Eric Tingwall

"The 2.5 isn't as punchy down low as the VW Golf's turbo, but it's more fun to work."

—Mike Sutton

a naturally aspirated version of the CX-9's turbocharged four. But it is obviously designed and engineered by the same clever people making similarly enlightened decisions. With its comprehensive small-car goodness and uncommonly luxurious feel for its class and price, the current 3 has piled up three 10Best trophies and four comparison-test wins. Long-term tests don't usually have winners, but the Mazda could reasonably be described as one.

In the 3 family, hatchbacks command a \$500 premium over sedans. Since the hatch is the better-resolved shape to our eyes, and since it inflates cargo volume from 12 to 20 cubic feet, paying the upcharge is a no-brainer to us. Lower-tier i-trim cars have a 155-hp 2.0-liter four-cylinder and 16-inch wheels with comparatively squishy 60-series tires. We opted for the top-shelf s Grand Touring hatch, base price of \$26,365. The s got us a 2.5-liter four that makes 184 horsepower and 185 pound-feet of torque, plus it includes 215/45 Dunlop SP Sport 5000s on 18-inch wheels.

A Grand Touring model also meant a lengthy list of standard legitimate luxury-car stuff: leather seats (heated in front), adaptive headlights, rain-sensing wipers, a head-up display, a rearview camera, blind-spot monitors, and a navigation/infotainment system that can be controlled either via a touchscreen or a knob between the front seats. Not to mention the sunroof, keyless entry and startup, and a Bose surround-sound system. Add in a \$1750 Appearance package (lower-body trim and a spoiler) and a few other tidbits such as floor mats and a cargo mat, and we arrived at \$28,510. That's a hefty exchange rate for a compact car, not exactly the commonly accepted definition of sensible in a Kirkland Signature world.

We wasted no time in adding to that cost. With just 6000 miles on the 3's clock, one of its most fervent acolytes backed it into a pole. A new bumper cover cost us \$1423. That this happened in a crowded coffee-shop parking lot gives his defense a solid foundation. That the pole was squarely center-screen on the 3's rearview camera means the prosecution has a stout case as well. Then the price of our Appearance package swelled by \$471 when the swish front splitter snagged on a steep driveway and departed the fascia.



**"THIS CAR IS SO CALM— SO RELAXING AND ENJOYABLE
TO DRIVE WITHOUT MUCH EFFORT— IT'S ALMOST MEDITATIVE."**

—JEFF SABATINI, FEATURES EDITOR





And just as the odometer was turning to 40,000, our newest road warrior initiated himself by pulling up behind a 15-passenger church van that then shifted into reverse and tried to back over him. That chewed up the grille, the front bumper, and the hood. Luckily, the damage to the latter was minor, and no new metal was needed. But the incident still sucked \$1814 out of our collection plate. If not for us, the 3 would have been an extremely cheap date. Our four regular service visits tallied \$472 in oil changes, tire rotations, and air filters for the engine and cabin [see “Service Timeline”].

Low operating costs are mere garnish, though, the wedge of lime on a big, sweaty glass of ice-cold dynamic brilliance. This unassuming little hatchback is a true driver’s car, with lessons to teach about friction circles and load transfer. Nearly twice as much caster as you’ll find in most of its contemporaries suffuses the 3’s steering wheel with natural increases and ebbs in effort as cornering loads vary. And Mazda’s expert tuning of the strut-front and multilink-rear suspensions lets the driver feel the effects of different loads on each corner, your line tangibly tightening or slackening in response to throttle position. Yet the 3’s damping is forgiving enough that the uninitiated would never suspect that a true hot hatch lurks within, instead only seeing an exemplarily civilized compact car.

With a 7.4-second zero-to-60 time, the 2.5-liter four is never going to overwhelm the 3’s chassis. But its torquey, linear delivery encourages redline pull after redline pull, and the 6300-rpm fuel cutoff feels at least 1000 rpm too early. The light, precise shifter floats from gate to gate with minimal effort, one of the best of its dying breed. And even though the 3’s stay in Ann Arbor was heavy



The 3’s infotainment-control knob makes easy the tasks that are infuriatingly complex in competitors. The tach and speed readout is a model of readability.

on commuter duty, we still saw an average of 31 mpg during its time here with us.

Our car’s simple but attractive two-tone leather interior—“Almond,” as Mazda calls this shade of beige, and black—looks so rich that your friends will assume the drinks are on you. Mazda’s interior-design

mantra could be summed up as “excellent simplicity.” There’s nothing overtly showy about it, but everything is handsomely rendered in quality materials. Something as humble as the door pull is an elegant swoop of satin silver, with hardly a flat surface to be found. There’s a single analog gauge in the instrument panel, a centrally mounted tachometer. And what a perfect gauge it is, with a brushed-chrome bezel and needle, a red outline, and a digital speed readout tucked into the lower-right quadrant that displays in the sort of innocently simple digits you’d see on a Casio wristwatch.

Rants & Raves

“If I were forced to wed a machine in some dystopian future, I’d marry the infotainment knob. It feels better than the twirly widget of the same function in a Rolls-Royce Wraith.”
—Alexander Stoklosa

“This car is a little sweetie. It has good looks inside and out, and both the front and rear seats are plenty comfortable for long trips.”
—Jennifer Harrington



HEADS UP, MAZDA

THE 3’S ONLY BIT OF FRIPPERY IS THE ILL-PLACED HEAD-UP DISPLAY SCREEN, A.K.A. ACTIVE DRIVING DISPLAY. MOUNTED ON THE TOP OF THE INSTRUMENT BINNACLE, YOU CAN TURN OFF THE PROJECTOR, BUT THE PLASTIC PANE REMAINS RAISED.

Service Timeline:

A car more reliable than its drivers.

Key: ● Repairs ● Damage ● Maintenance
● Normal Wear ● Oil Additions

January 5, 2015
62 miles: Our Mazda 3 arrives in Ann Arbor

January 12, 2015
997 miles: Michelin X-Ice winter tires installed

March 17, 2015
4797 miles: Dunlop SP Sport 5000 all-season tires refitted

April 13, 2015
6012 miles: Rear bumper cover replaced after a driver backs into a pole, \$1423

June 4, 2015
9940 miles: The 3 reports 40 percent oil life remaining, but its manual says the max interval is 10,000 miles. The first service consists of an oil change and tire rotation, \$99

September 17, 2015
18,290 miles: Along with lube and a tire rotation, the dealer replaces the cabin and engine air filters, \$187
● Software updates address radio issues, \$0





Flanking the tach are digital readouts for the gear indicator and odometer on the left, with a simple trip computer and fuel gauge on the right. The 3 only presents the important information, in stark black and white, with no intention to impress, only to quickly convey the numbers you need.

Likewise, you'll find no thumbwheels, touchpads, or other gimmickry on the steering wheel, just the necessary buttons where you expect them to be. We've celebrated Audi's haptics team, a faction of the design and engineering squads tasked with ensuring that the secondary controls in its cars have a common, high-quality feel. Mazda's HVAC and infotainment-control knobs suggest that the company either employs such a squad or has a parts pipeline from Ingolstadt. The graphics on the seven-inch infotainment screen are crisp and easy to read, and the menu structure is logically organized—an increasingly rare state of



October 7, 2015
21,011 miles: Winter tires fitted

February 8, 2016
30,330 miles: Oil change and tire rotation, \$80

February 17, 2016
30,560 miles: Dealer replaces the lower front valance that we tore off, \$471

March 28, 2016
33,014 miles: All-season tires reinstalled

July 7, 2016
40,697 miles: The fourth service calls for an oil change and a tire rotation, \$106

July 13, 2016
40,756 miles: Front bumper cover and grille replaced and hood

repaired after the Mazda is turned into a parking chock for a 15-passenger van, \$1814

July 13, 2016
40,757 miles: Test concludes after 18 months

OPERATING COSTS (FOR 40,000 MILES)	
MAINTENANCE	\$472
NORMAL WEAR	\$0
REPAIR	\$0
GASOLINE (@ \$2.22 PER GALLON)	\$2865
DAMAGE AND DESTRUCTION	
REPLACE REAR BUMPER COVER	\$1423
REPLACE LOWER FRONT AIR DAM	\$471
REPAIR FRONT-END DAMAGE	\$1814
SERVICE	
DEALER VISITS (SCHEDULED/UNSCHEDULED) ...	4/0
DAYS OUT OF SERVICE	5
UNSCHEDULED OIL ADDITIONS	0 qt





affairs. The car's single misstep was an infotainment hiccup early in its stay when the music from a USB-connected iPhone suddenly quit, in spite of the fact that the phone showed the song still playing. After disconnecting and reconnecting a couple of times, we gave up and switched to the radio, only to discover that it would only play from the speakers on the right side of the car. At this time, spoken directions from the navigation system also ceased. So we gave it the ol' Microsoft—a quick shutdown and restart—and all was well. We heard of other owners having similar issues, but a software update at the next service banished the problem forever.

None of us ever shied away from putting a thousand miles on the 3 in a weekend. In its 18 months in our hands, the little Mazda wandered to Maryland, New York City, and the Indy 500, with drivers unfailingly returning with only positive things to say. After spending nearly four months with the Mazda on his Double J Cat Ranch in Darby, Montana, John Phillips called it “a little gem of conscientious engineering.”

Try as we may be contractually obligated to, we found precious little to complain about. Our car's brake pedal was mushy enough that one staffer wondered if there was air in the system, and several



Rants & Raves

“As it nears the end of its stay, the 3 still feels like a new car in almost every way. The ride is sublime, the interior has held up well, and the infotainment system is free of quirks.”

—Greg Fink

“I hate the stupid Active Driving Display. Please let people close that thing, Mazda.”

—Zeb Sadiq

others suggested we try swapping out the pads. Those of us who run radar detectors griped that the 12-volt power outlet is behind the shifter, causing power cords to get tangled on the stick. But mostly our critiques were acrobatic feats of reaching. When pressed to fill in the cons column, one staffer said he'd rearrange the cupholders so that the shallower receptacle was in front of the deeper one. “Yes,” he wrote, “it's really that good.”

The most obvious criticism of our 3 is one that was never mentioned by any logbook scribbler: its \$28,510 price, which is quite a sum for a car in this class. It speaks volumes to the 3's excellence that every last staffer shrugged it off. Actually, Phillips did address the value question, but he called the 3 “one of the few cars on the market today that is worth more than it costs.” You can buy plenty of larger or more-powerful cars, or those with more-prestigious badges. But spend what you will, it's hard to buy any more greatness than this.

2015 MAZDA 3 S GRAND TOURING

PRICE AS TESTED **\$28,510**
BASE PRICE **\$26,365**

VEHICLE TYPE: front-engine, front-wheel-drive, 5-passenger, 4-door hatchback
ENGINE TYPE: DOHC 16-valve Atkinson-capable inline-4, aluminum block and head, direct fuel injection
DISPLACEMENT 152 cu in, 2488 cc
POWER **184 hp @ 5700 rpm**
TORQUE **185 lb-ft @ 3250 rpm**
TRANSMISSION 6-speed manual
WHEELBASE 106.3 in
LENGTH 175.6 in
WIDTH 70.7 in
HEIGHT 57.3 in
CURB WEIGHT 3020 lb

WARRANTY

3 years/36,000 miles bumper to bumper
5 years/60,000 miles powertrain
5 years/unlimited miles corrosion protection
5 years/60,000 miles roadside assistance

MODEL-YEAR CHANGES

2016: Automatic headlights, rain-sensing windshield wipers, and an auto-dimming interior mirror are now standard equipment on Grand Touring models. A rearview camera is standard on all trims.

2017: G-Vectoring Control, which aims to improve turn-in response, comes standard across the lineup.

CAR AND DRIVER TEST RESULTS

PERFORMANCE

ZERO TO 60 MPH:

NEW 7.4 sec
40,000 7.2 sec

ZERO TO 100 MPH:

NEW 19.0 sec
40,000 19.1 sec

ZERO TO 120 MPH:

NEW 32.8 sec
40,000 33.0 sec

ROLLING START, 5–60 MPH:

NEW 7.5 sec
40,000 7.8 sec

1/4-MILE:

NEW 15.6 sec @ 91 mph
40,000 15.6 sec @ 91 mph

BRAKING, 70–0 MPH:

NEW 165 ft
40,000 174 ft

ROADHOLDING, 300-FT-DIA SKIDPAD:

NEW 0.83 g
40,000 0.83 g

TOP SPEED (GOVERNOR LIMITED) 131 mph

EPA FUEL ECONOMY, COMBINED/CITY/HWY 29/26/35 mpg

C/D-OBSERVED FUEL ECONOMY 31 mpg

LIFE EXPECTANCIES

(ESTIMATED FROM 40,000-MILE TEST)

TIRES 45,000 miles

FRONT BRAKE PADS more than 100,000 miles

REAR BRAKE PADS more than 100,000 miles

WHAT BITS AND PIECES COST

HEADLAMP \$1005

ENGINE AIR FILTER \$20

OIL FILTER \$8

WHEEL \$410

TIRE \$167

WIPER BLADES (LEFT/RIGHT/REAR) ... \$9/\$9/\$15

FRONT BRAKE PADS \$82

5-YEAR ESTIMATED COST OF OWNERSHIP

YEAR	1	2	3	4	5	TOTAL
DEPRECIATION	\$8560	\$2275	\$2275	\$2000	\$2300	\$17,410
FINANCING	\$718	\$568	\$414	\$255	\$91	\$2046
FUEL	\$1074	\$1113	\$1161	\$1210	\$1258	\$5816
INSURANCE	\$2883	\$2929	\$2985	\$3044	\$3105	\$14,946
TAXES AND FEES	\$1535	\$61	\$59	\$58	\$54	\$1767
MAINTENANCE AND WEAR	\$105	\$261	\$921	\$271	\$577	\$2135
REPAIRS	\$0	\$0	\$0	\$0	\$320	\$320
TOTAL	\$14,875	\$7207	\$7815	\$6838	\$7705	\$44,440

Depreciation data from ALG. Based on 15,000 miles per year.



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Fleet Files:

Here's how our other long-term vehicles are faring in their 40,000-mile trials:



▲ *Newcomer*

2016 BMW 740i

Arrival: Apr/2016
Miles: 7160 Observed mpg: 26

WE'VE BEEN CONDITIONED to think of BMW's flagship as a six-figure Gulfstream for the road, but that notion is being challenged by our newest long-term arrival, a 7-series sedan that rings in at a relatively cool \$96,095. To keep the bill under \$100K, we started with the cheapest model, the rear-wheel-drive, six-cylinder 740i, then larded on \$13,800 in options. The Luxury Seating (\$3900), Executive (\$4100), and Driver Assistance Plus (\$1900) packages bring indulgences such as front and rear heated armrests, a seven-inch tablet that controls the climate and audio systems from the back seat, and a slick Surround View system, which stitches together images from four cameras to give the impression that a drone is circling your car. We added \$900 to the window sticker for a larger sunroof, \$2600 for 20-inch wheels, and \$250 for a key fob with a tiny touchscreen. In hindsight, we'd pass on that last option, as it's made redundant by a free phone app.

Tasked with moving 4385 pounds, the 320-hp inline-six works hard but efficiently. In its initial test, the 740i cleared 60 mph in 4.8 seconds, and, through more than 7000 miles, it is beating its EPA combined rating by 2 at 26 mpg, making this particular 7-series thrifty in more than one way. —*Eric Tingwall*

2016 Mazda MX-5 Miata Club

Arrival: Oct/2015
Miles: 17,761
Observed mpg: 32

Like many a Midwesterner, our perky Miata emigrated to Los Angeles on the promise of endless sun in the land of waving palms and lapping waves. Once there, though, reality bit hard. Street-parking junkers ran into both ends, rearranging its face and rear bumper. Then some Angeleno lowlife punched out a taillight. No obvious reason why, just a shattered lens on the ground and scuff marks from what may have been a Doc Martens, whose tagline is "refined rebellion." Abused by L.A., the Miata shuffled back to Michigan like Steve Martin in *The Jerk*, but instead of the ashtray, chair, and paddle game, it bears an as-yet-undetermined bill for body repair and a new \$269 taillight. We will nurture and repair our wayward son here in the heartland.

—*Aaron Robinson*



2015 Tesla Model S P85D

Arrival: Apr/2015
Miles: 30,306
Observed MPGe: 68

What maintenance does an EV need? Tesla's \$756 25,000-mile service calls for replacement of the cabin air filter, the wiper blades, the key-fob batteries, the A/C desiccant bag, and the brake fluid. But the bigger oddity is that our nearest service center is in Ohio. Because Tesla is prohibited from setting up shop in Michigan, the dealer drops off a loaner and trailers our car to Cleveland. That 180-mile trip would otherwise barely be within a single charge's range for our P85D, according to a recent highway-range test. On a summer day with temps in the mid-70s, we set the climate control to 72 degrees and the cruise control to 75 mph. Our Model S predicted a 246-mile range when charged to "trip mode," but we ran it to an indicated three miles remaining in just 206 miles.

—*Eric Tingwall*



2016 Honda Pilot Elite

Arrival: Dec/2015
Miles: 21,404
Observed mpg: 21

Three-row family haulers tend to race through their 40,000-mile stints here. Our Pilot traveled to the Kentucky Derby, Washington, D.C., northern Michigan, and then back to Virginia (with a detour through New Brunswick and Nova Scotia on the way home) in barely a month. Pilots start at \$31,245, but our \$47,955 Elite model has bells on its whistles, with navigation, leather seats (heated and cooled up front, heated in the middle), five USB ports, Blu-ray rear-seat entertainment, and way more. Should any of this distract the driver, there's forward-collision warning with automatic braking, blind-spot monitoring, and lane-keeping assist. A 3.5-liter V-6 shuttles 280 horsepower to all four wheels through Honda's new nine-speed auto.

—*Jared Gall*

2016 NISSAN
TITAN XD DIESEL
4X4 CREW CAB
1000 MILES

2016 CHEVROLET
CAMARO SS
11,671 MILES

2016 FORD
MUSTANG GT
22,325 MILES

2015 VOLKSWAGEN
GTI
39,727 MILES

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2015-2016 Performance & Safety															Total Reviews
Model	Year	Rating	1	2	3	4	5	6	7	8	9	10	11	12	
Audi A8	2015	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	290,300
Audi A8	2016	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	46,172,520
Audi A8	2017	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	967,790
Audi A8	2018	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	258,818
Audi A8	2019	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1,641,940
Audi A8	2020	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5,578,500
Audi A8	2021	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	246,500
Audi A8	2022	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4,567,890
Audi A8	2023	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	23,138,180
Audi A8	2024	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9,581,420
Audi A8	2025	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1,818,320
Audi A8	2026	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3,861,040
Audi A8	2027	4.5	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	40,018,060





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A Nearly Perfect Dozen

Modernized Aston pens an ode to the past with this giant Euro GT, the **DB11**. *by Aaron Robinson*

▼
THE V-12 IS A VERY OLD, very antiquated answer to a very old, enduring question: How do you make a lot of power smoothly with a reciprocating engine? Nowadays, with balance shafts and miniature-marvel computers, a turbo four does a pretty good job, and more than one company makes a buttery V-8 that wouldn't tip over a standing nickel. Add direct injection and turbos and you have V-12 power without the size, weight, and moving parts. But there's just something about sitting behind—or in front of—two inline-sixes married at the crankshaft. The V-12 is the triple-axis tourbillon of an increasingly quartz engine world, and it delights us precisely because of its excessive parts count.

Oddly, Aston Martin considers itself a V-12 company, even though its most glorious David Brown era depended on inline-sixes. Carroll Shelby and Roy Salvadori won Le Mans behind one in 1959, and the straight-six served Aston well into the 1970s, when its attention turned to bulldog V-8s. The company didn't get its first V-12 until 2001, a 5935-cc unit made by splicing together two Ford Duratec V-6s in a CAD program. Ferrari is a V-12 company;

Lamborghini is a V-12 company; Jaguar is a V-12 company, though it hasn't sold one in years. Aston Martin? Well.

But we're willing to forgive this conceit, which issues from Aston CEO Andy Palmer, a recent refugee from the upper ranks of Nissan who has two ideal qualifications for his current position: He is an engineer, and he is British. Under Palmer, and with company ownership divided primarily among investment groups in Kuwait and Luxembourg plus Daimler AG, Aston Martin is a brand on the

[+] Gorgeous, lavishly retro, 12 drummers drumming. [-] Useless back seats, the existence of speed cameras.

move. The new DB11 featured here is the first shot in a rapid-fire (for Aston, anyway) six-year product salvo intended to more than quadruple company output to 14,000 vehicles per year and put Aston on sturdy financial ground.

Leading is the middle child, the DB11, introducing an all-new riveted and adhesive-bonded aluminum platform that shifts the emphasis from extrusions to stampings

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to create more cockpit space. It's due in U.S. showrooms before the end of the year with a base price of \$214,820. Next year the new entry-level Vantage makes its debut with a V-8 from Mercedes-Benz, a dividend of Daimler's 5-percent stake in Aston. A redesigned Vanquish appears in 2018 as the top-spec two-door car, the styling of both it and the Vantage intended to build greater separation between the poles of Aston's sports-car lineup. Convertible versions of all three will follow.

In 2019, the DBX crossover, Aston's biggest gamble ever, will march forth from a new factory adjacent to a former RAF base in Wales. And if that weren't enough, Aston plans to relaunch the Lagonda nameplate by 2020 with a luxury liner aimed at Bentley and Rolls-Royce; market an all-electric 200-plus-mile-range RapidE to give Tesla Model S customers a way to spend even more money; and produce more limited-run multimillion-dollar specials, such as the recently announced AM-RB 001, a mid-engine hyper-limpet conceived in partnership with Red Bull Racing.

Big plans. *Inshallah*, it will all come to pass.

Meanwhile, the DB11 is here, ready to be sampled in central Italy's Tuscan highlands. This giant coupe is a thematic throwback to an age when Italians drove tiny Fiat Cinquecentos, speed cameras were unheard of, and the royalty cruised in Ferrari 365GTs and the like, high-beams flashing to shoo aside the peasants.

The world has changed, but we can still love the old ways. The DB11 is a big, powerful softy. In the cushiest of its three suspension modes, the dampers allow deep strokes and the car squats theatrically under acceleration, even shimmying a little at the rear if you catch a bump just right.

Our route through Tuscany took in a lot of narrow, snaking roads, on which the car felt a bit caged if still competent. The brakes are firm, and the steering weight and tune are organic if not quite sharp enough for a pounding pace. The transmission paddles have excessively long throws, making manual shifting less than gratifying. Aston does get points for separating the suspension-mode control from the throttle/transmission control, of which there are

also three positions. Thus, you can put the suspension in the more tied-down middle setting without being forced into a correspondingly sharper shift and throttle map. Turn both controls up to max attack and the DB11 is still no street brawler. In sport-plus it becomes about as aggressive as the Earl of Denbigh upon discovering that the brandy has turned.

Gaze at the photos for a minute and admire how Aston rolled the dice on some new ideas while also retaining the basic water-smoothed shape of a river stone, the one introduced with the 1994 DB7. The DB11 is long, low, and extravagantly wide, as was its slippery predecessor, the DB9. But it gets a little more technical with LED light blades, a few beveled edges, and the "roof strake," a flashy bit of armor that arches over the cockpit and sacrilegiously cleaves the steeply raked C-pillar, an Aston trademark.

The strakes' mechanical purpose is to frame the AeroBlades, air ducts hidden in the rear haunches that direct wind through the body, squeezing and twisting it before exhausting it out a vent in the trunklid to reduce drag at speed. It also has an aesthetic mission: It can be ordered anodized in black, or body color, or as polished aluminum, and it demarks the DB11 from all previous Aston Martins.

Another departure from the Aston coupe's typical flowing beauty is the broken front wheel-arch line, which is punctuated by a deeply scalloped air vent where the new, huge one-piece aluminum clamshell hood meets the body side. The C4 Corvette-like clamshell, a substantial engineering and stamping achievement, we're told, supplies both closure-line cleanliness and pedestrian-impact regulatory compliance. Small winglets in the hood ducts that relieve air pressure from inside the front wheelhouses direct the stream out in a tumbling vortex pattern that mixes with hot engine-compartment air from the side vents to further aid aerodynamic efficiency.

Beneath it all is the new 5.2-liter twin-turbo V-12 that replaces the old naturally aspirated 5.9, which still powers the more expensive Vanquish for now. Like the 5.9, the 5.2 comes via Ford's Cologne,

tech highlight

ASTON'S HALF-GASSED EFFORT

As CO₂ regulations turn the screws, Aston Martin tries to keep the historic V-12 architecture relevant a little longer by brooming its old 5.9-liter for a turbo 5.2 with cylinder deactivation. Under light loads, the unit becomes two inline-sixes that operate in an alternating pattern that keeps the temperatures up. For simplicity, it only cuts fuel and spark, and only to one side, then returns them to both sides, then cuts the other side. Mercedes' M137 V-12 also did the inline-six trick in the early 2000s, but with a complex mechanism that disabled the valve-train to reduce pumping losses, and always on the same side.



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2017 ASTON MARTIN DB11

VEHICLE TYPE: front-engine, rear-wheel-drive, 2+2-passenger, 2-door coupe

BASE PRICE: \$214,820

ENGINE TYPE: twin-turbocharged and intercooled DOHC 48-valve V-12, aluminum block and heads, port fuel injection

DISPLACEMENT: 318 cu in, 5204 cc

POWER: 600 hp @ 6500 rpm

TORQUE: 516 lb-ft @ 1500 rpm

TRANSMISSION: 8-speed automatic with manual shifting mode

DIMENSIONS

WHEELBASE: 110.4 in

LENGTH: 186.6 in

WIDTH: 76.4 in

HEIGHT: 50.4 in

PASSENGER VOLUME: 76 cu ft

CARGO VOLUME: 10 cu ft

CURB WEIGHT: 4300 lb

PERFORMANCE

(C/D EST)

ZERO TO 60 MPH: 3.9 sec

ZERO TO 100 MPH: 8.7 sec

1/4-MILE: 12.3 sec

TOP SPEED: 200 mph

FUEL ECONOMY

(C/D EST)

EPA COMBINED/CITY/

HWY: 17/13/22 mpg

Germany, plant, but Palmer swears up and down that Aston did the engineering. “We had a choice between doing a new V-12 or a new V-8, so we picked the 12 [for the DB11] and are sourcing the 8 [for the Vantage] from a partner,” he said, referring to Mercedes.

Just two minor parts carry over from the 5.9, making the 5.2’s 60-degree block and four-valve, port-injected cylinder heads into a wholly new engine, as far as Palmer is concerned. The twin turbochargers are life extenders for the V-12, he says, giving the 12 one or two more generations before CO₂ regs will force it into hybridization or oblivion. Also, cylinder deactivation is a fresh wrinkle. It engages at lower power settings to turn the engine into a pair of inline-sixes, the switch from one side to the other happening every 20 seconds or so to keep all the catalytic converters warm [see tech highlight]. There is no indicator and, from our drive, no indication that it is at work, the standard eight-speed ZF automatic going about its seamless business as though nothing has changed. Inherent balance is a wonderful thing.

DB buyers are Aston’s most conservative, says Palmer, even more so than those of the pricier Vanquish. Thus, the interior looks like a Florentine leather shop with a

Aston stole the front grille of the Ford Fusion for use on the DB11. We might be wrong on that. These wingtip-inspired seats are the stuff of cobblers’ dreams.

steering wheel. Fans of ornamental stitching are an optional upgrade away from the otherwise plain seats; same goes for the somewhat frilly brogue work on the center armrest and door leather that makes it look like a deconstructed dress shoe. Optional trims include carbon fiber or natural-looking wood. Daimler’s participation is evident in some Mercedes switchgear and the infotainment screen, which will be familiar to any current Benz owner.

You know you’re in a luxury GT and not a sports car because of the motorized center-armrest/storage-bin lid. Also electrified is the trunk pull-down and, in a first-ever seen by this author, the twin hood latches. Just drop the hood and electric claws grab it at two corners and draw it down. Mechanics will surely appreciate that feature, though owners might have preferred automatic door sealers instead.

In all, it’s a pretty fabulous way to sit behind 600 horsepower, even if the rear “seats” are nothing more than potato-sack holders with belts. Your kids may caterwaul, may even complain about the shortage of outward visibility, but you will look stunning scything through city traffic and onto the big motorways of the Continent.

No, it wasn’t until we hit the more open roads in the valleys, and especially the Siena–Firenze autostrada, that the DB11 reached its happy place. It roars along—a quiet roar, unaided by electronics except for muffler flaps that stay open in sport-plus—inhaling lane lines. The V-12 betrays its compressors in the way it rapidly spools and then plotzes a little too suddenly when you lift, but it’s still a marvelous engine situated in the perfect vehicle for such things.

And that’s why you’d want a DB11. Because if we can’t all go back in time, then going forward behind a V-12 is as glorious as it gets.

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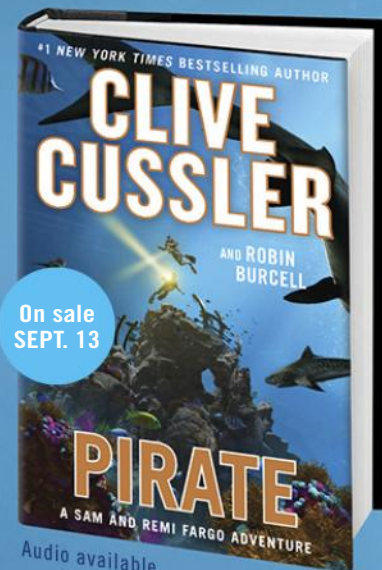
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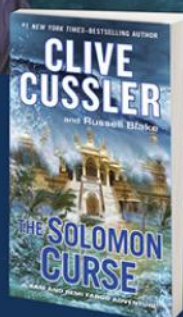
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Form Follows Fashion

Benz's **GLC300 coupe** and the sacrifices we make for style. *by Andrew Wendler*

AS WITH SKINNY JEANS, which put the emphasis on shape rather than utility, the 2017 Mercedes-Benz GLC coupe is a stylish cut of otherwise broad cloth that leaves far less room for your junk.

At 63 inches high and 186.2 inches long, it measures 1.5 inches lower and 2.9 inches longer than the standard GLC300 crossover. The split rear taillamps and a sharp spoiler lip are said to echo those of the S-class coupe. Squint and you can sort of see it, but the GLC coupe definitely resides in a different tax bracket. Even so, the standard equipment includes a sunroof plus powered driver's seat, hatch, and folding mirrors, among other minor niceties.

The same 241-hp turbocharged four-cylinder engine that propels the squarer GLC wagon provides motivation for the four-door "coupe." A nine-speed automatic transmission with shift paddles shuffles 273 pound-feet of twist to all four wheels via the standard 4MATIC all-wheel-drive system. Although Mercedes hasn't released official zero-to-60-mph numbers yet, in our hands the GLC300 wagon hit the benchmark in 6.0 seconds. To bring the handling up to a level worthy of something called a coupe, Mercedes fits slightly stiffer springs, dampers, and bushings and quickens the steering ratio from 16.1:1 in the GLC wagon to 15.1:1 in the coupe.

Mercedes engineers took a Nigel Tufnel approach with the coupe's five dial-selected drive modes (eco, comfort, sport, sport-plus, and individual). Each mode, they say, should be considered "one more sporty" than the same settings in the GLC300

crossover. American cult films don't translate easily into German, but a cultural envoy wasn't needed to discern that the sport-plus setting was best for winding through the narrow mountain roads in northern Italy. Tugging on the shift paddles was optional; the setting holds on to gears until near redline.

The coupe hung tight in the bends, demonstrating mild and predictable understeer, the sport-plus setting allowing the occasional wiggle to be coaxied from the rear end when throttle/steering and road conditions permitted. A firm brake pedal revealed no fade even after long downhill stretches punctuated by dozens of tight hairpins. At speed, the GLC300 coupe displayed the same quiet, solid interior traits as its crossover cousin, albeit with slightly diminished rearward visibility.

If you hold to the notion that a crossover vehicle's appeal is grounded in all-around practicality and utility, then its coupe variant makes no more sense than a pair of jeans you can't wear to a construction site. Yet for some, the idea of spending a couple thousand more for a piece of tailoring is worth sparing the off-the-rack indignity of one-size-fits-most. Look for the GLC coupe to hit showrooms early next year, just in time for fashion week.

2017 MERCEDES-BENZ GLC300 COUPE

VEHICLE TYPE: front-engine, all-wheel-drive, 5-passenger, 4-door hatchback

BASE PRICE (EST): \$44,000

ENGINE TYPE: turbocharged and intercooled DOHC 16-valve inline-4, aluminum block and head, direct fuel injection

DISPLACEMENT: 122 cu in, 1991 cc

POWER: 241 hp @ 5500 rpm

TORQUE: 273 lb-ft @ 1300 rpm

TRANSMISSION: 9-speed automatic with manual shifting mode

DIMENSIONS

WHEELBASE: 113.1 in

LENGTH: 186.2 in

WIDTH: 74.4 in

HEIGHT: 63.0 in

CURB WEIGHT: 4050 lb

PERFORMANCE (C/D EST)

ZERO TO 60 MPH: 6.0 sec

ZERO TO 100 MPH: 17.7 sec

1/4-MILE: 14.8 sec

TOP SPEED: 135 mph

FUEL ECONOMY (C/D EST)

EPA COMBINED/CITY/

HWY: 24/21/28 mpg

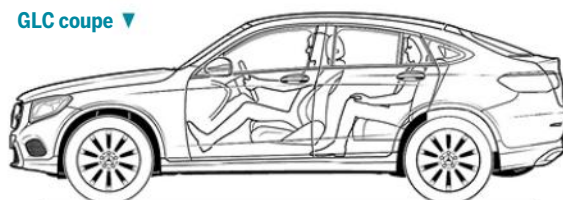
[+] Stylish form, agile handling, reasonable performance. [-] Compromised visibility and space in the name of vanity, expected price premium over the standard GLC300.

haircut

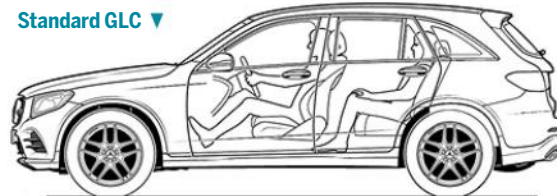
SPACE INVADING

Compared with the standard GLC, the coupe provides less headroom (by 3 percent in back and 7 percent up front), lower seat bottoms (especially in the rear), lower cargo-area height, and higher liftover. Such are the sacrifices for fashion.

GLC coupe ▼



Standard GLC ▼



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Harder Top, Softer Soul

Like its topless brother, Porsche's **718 Cayman** gains new engines but loses some character. *—by Mike Duff*

▼ **WE'VE GROWN USED TO DOWNSIZING** in recent years, but this still feels like a personal insult. The new Porsche 718 Cayman replaces a car that came compellingly close to perfection, trading its predecessor's endlessly charismatic flat-sixes for a pair of new, smaller turbocharged flat-fours.

If this sounds familiar, that's because it follows the lead of its 718 Boxster brother. In fact, Porsche now admits that the Cayman isn't a separate model line so much as a coupe version of the roadster. All mechanical components are shared, meaning the same choice of engines: a 350-hp turbo 2.5-liter four in the Cayman S and a turbo 2.0-liter four producing 300 horsepower in the base car. The last time Porsche introduced an engine with so little displacement

[+] Even quicker than before. Still borders on sports-car perfection.
[-] Less aural enthusiasm than its predecessor.

was back in 1977, with the original 924—although that car could only wheeze out 95 horsepower beneath the burden of its emissions-control equipment.

The big story isn't the modest increase in power over the naturally aspirated flat-sixes of the last Cayman, but the considerably bigger jump in torque. The Cayman S now has 309 pound-feet, while the regular car musters 280 pound-feet, the same as the outgoing GTS. Both deliver that output across broad plateaus that start below 2000 rpm. So, while the previous Cayman

needed to be worked hard to deliver its best, the 718 just pulls, pretty much from the basement to the penthouse.

The new car doesn't sound bad, but neither does it harmonize as well as the old one. Porsche's engineers have worked hard to give the 718 an appropriately manly voice, and, to their credit, it never sounds like a mid-engined Subaru. As revs rise, it just gets louder, but without the goose-bump-inducing pitch shift its predecessor pulled off as redline approached. At idle, the turbocharged engine also produces a familiar rhythm that anyone over 35 will instantly associate with an air-cooled Volkswagen Beetle.

Compensation for the reduction in character is an increase in pace, both from the punchier engines but also from an upgraded chassis. Porsche has always excelled at balancing performance, and

the 718's increase in urge has required a commensurate increase in handling to keep it in check. Both the Cayman and Cayman S get firmer springs and dampers, revised suspension geometry, and a quicker steering rack bequeathed by the 911 Turbo. The result is a car that feels both agile and stable at speed, and indeed more mid-engined. While previous Caymans often felt as if they had been set up to deliver a 911-lite driving experience, this one feels markedly more responsive than a base Carrera, better able to exploit its more sensible weight distribution when making progress along a twisting road.

Yet while the new Cayman is demonstrably better on pretty much every metric that can be measured, it has lost some of its predecessor's soul. Even Porsche engineers quietly admit that they wouldn't have ditched the six-cylinder heart of the thing unless they were compelled to. But with the possible exception of the V-4-powered 919 hybrid LMP1 race car, this is definitely the most exciting four-cylinder Porsche so far.

2017 PORSCHE 718 CAYMAN/S

VEHICLE TYPE: mid-engine, rear-wheel-drive, 2-passenger, 2-door hatchback

BASE PRICE: \$54,950–\$67,350

ENGINES: turbocharged and intercooled DOHC 16-valve 2.0-liter flat-4, 300 hp, 280 lb-ft; turbocharged and intercooled DOHC 16-valve 2.5-liter flat-4, 350 hp, 309 lb-ft

TRANSMISSIONS: 6-speed manual, 7-speed dual-clutch automatic with manual shifting mode

DIMENSIONS
WHEELBASE: 97.4 in
LENGTH: 172.4 in

WIDTH: 70.9 in

HEIGHT: 51.0 in

CARGO VOLUME: 5/10 cu ft (front/rear)

CURB WEIGHT: 2950–3200 lb

PERFORMANCE (C/D EST)

ZERO TO 60 MPH: 3.9–4.8 sec

ZERO TO 100 MPH: 9.4–11.2 sec

1/4-MILE: 12.4–13.4 sec

TOP SPEED: 170–177 mph

FUEL ECONOMY

EPA COMBINED/CITY/

HWY: 22–25/20–22/

26–30 mpg

WASSER-BOXER

This turbocharged flat-four is the heart of the 718 Boxster S and 718 Cayman S. It pulls hard, but following the old flat-six is like following Jimi Hendrix onstage.



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Can you spot the difference?



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Tokyo Drift

The 2017 Subaru **BRZ** erupts from Fuji refreshed and refined. *by David Beard*

▼ **OUR BLAST DOWN** Fuji Speedway's nearly mile-long front straight in the new Subaru BRZ takes longer than figuring out how to get a can of cold Calpis from a Japanese vending machine. As a blanket of fog descends from the Mount Fuji foothills, the track surface becomes damp, the racing lines slick, and the visibility limited. Braking hard into the Turn 1 hairpin, jerking the wheel, and stomping the throttle, one thing becomes obvious about the new Subaru BRZ: It is more drift-capable than ever.

Not that the outgoing model wasn't a tail-happy machine itself, but, for 2017, Subaru's engineers went opposite to convention. The BRZ has less electronic intervention than its predecessor. The former sport-mode programming steps aside and track mode takes its place. With the car's reeducated brain, well-controlled drifts become possible while the stability-control net remains active in case things get out of hand.

Through Fuji's fast corners, the car's body roll is more predictable and controlled than before thanks to minor changes within the BRZ's structure. Subaru bulked up mounting surfaces for the transmission, the front strut-tower brace at the firewall, and the rear spring perches. The coupe's quick, natural-feeling steering now builds more linearly thanks to software tuning of the electrically assisted system. Stiffer front and softer rear springs paired with a larger rear anti-roll bar provide a more planted, apex-hunting turn-in, despite the car's soldiering on with the meager Michelin Primacy HP rubber from past BRZs.

[+] More power. Finally. [-] A difference, to be a difference, has to make a difference.

direct-injection pump to reduce drag. Subaru claims it strengthened the pistons and crank bearings to withstand the whopping gains of five horsepower and five pound-feet of torque, bringing totals to 205 and 156, respectively. While this output bump remains inconspicuous around Fuji's 2.8-mile configuration, the new, lower final-drive ratio (from 4.1:1 to 4.3:1) helps ameliorate the large mid-range torque hole still present in the BRZ's power delivery. Further elevating the driving experience is a new \$1195 Performance package. Unlike past color-coded marketing gimmicks (the Series.Blue and Series.HyperBlue editions), this optional kit is functional. Revalved ZF Sachs dampers at all four corners add to the improved body control, while wider wheels make room for four-piston front and two-piston rear Brembo calipers and STI rotors. The pedal feel remains firm through Fuji's fast braking zones; unlike with the base brakes, fade fades as a concern. But stopping power is largely tire limited anyway, so anti-lock intervention happens quicker than with standard binders.

A new front fascia makes the car look wider and is positioned lower for improved aero. The headlamps and taillights now use LEDs exclusively. Inside, a new, smaller steering wheel becomes the center of attention. The Limited trim now comes with a 4.2-inch performance display that monitors fluid temperatures, lateral and longitudinal acceleration, lap times, and power delivery.

Though these are big changes for small gains, they genuinely improve this, the best driver's coupe under \$30,000.

A power boost has topped our wish list for the BRZ since its inception. When the BRZ is equipped with the only worthwhile transmission, the six-speed manual, this wish is granted—sort of. Subaru installed a freer-flowing intake and exhaust manifold to aid respiration. Anti-friction countermeasures include polishing of the valves and camshafts along with tuning the

2017 SUBARU BRZ

VEHICLE TYPE: front-engine, rear-wheel-drive, 4-passenger, 2-door coupe

BASE PRICE: \$26,315–\$30,515

ENGINE TYPE: DOHC 16-valve flat-4, aluminum block and heads, port and direct fuel injection

DISPLACEMENT: 122 cu in, 1998 cc

POWER: 200 or 205 hp @ 7000 rpm

TORQUE: 151 or 156 lb-ft @ 6400 rpm

TRANSMISSIONS: 6-speed manual,

6-speed automatic with manual shifting mode

DIMENSIONS

WHEELBASE: 101.2 in

LENGTH: 166.7 in

WIDTH: 69.9 in

HEIGHT: 50.6 in

PASSENGER VOLUME: 80 cu ft

TRUNK VOLUME: 7 cu ft

CURB WEIGHT: 2750–2850 lb

PERFORMANCE (C/D EST)

ZERO TO 60 MPH: 6.4–7.5 sec

ZERO TO 100 MPH: 16.6–20.1 sec

1/4-MILE: 15.0–15.8 sec

TOP SPEED: 140 mph

FUEL ECONOMY

EPA COMBINED/CITY/HWY: 24–27/21–24/

29–33 mpg

FLYWEIGHT BOXER

Subaru forgot to add the turbo to its reworked 2.0-liter, but the slight power gain is welcome.



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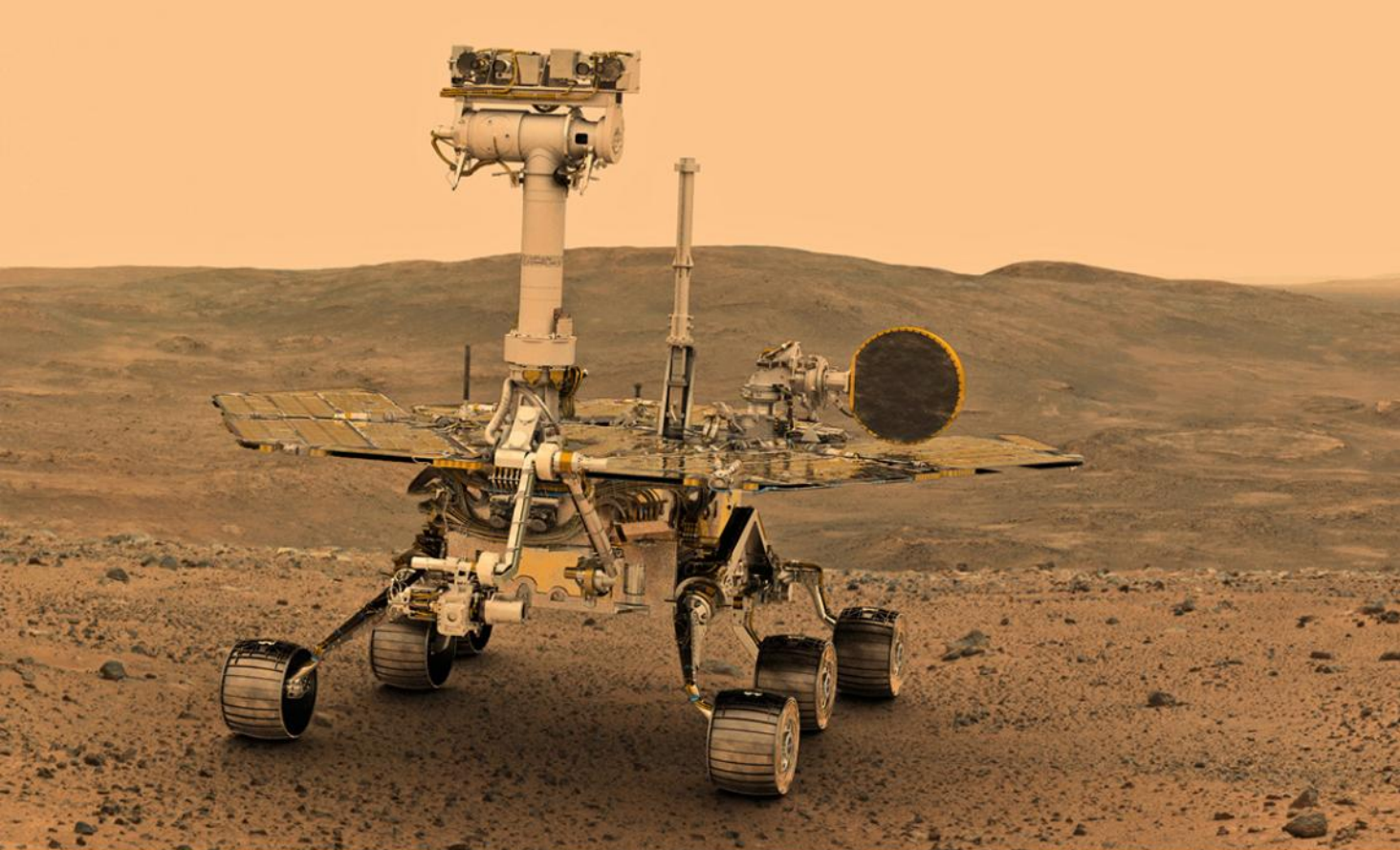
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Opportunity Knocks

Driving JPL's **Mars rover**. Again.
by John Pearley Huffman

▼ **IT HAS BEEN A DECADE** since C/D went to the Jet Propulsion Laboratory (JPL) in Pasadena, California, to learn the fundamentals of operating NASA's Mars rovers. That was back in 2006 when there was no iPhone; Barack Obama was Illinois' junior senator; and Pontiac, Hummer, Saturn, and Mercury were all going concerns. It was a different world.

Mars, however, hasn't changed much.

Back then, the solar-powered twin rovers, *Spirit* and *Opportunity*, had been on Mars for less than three years. Both were drilling into rocks, climbing hills, dodging boulders, and checking for water. In other words, doing science stuff. But this is 2016 and, incredibly, *Opportunity* still lives on to teach us a lot about Mars and a little bit about automated driving. Though if it breaks down, help is about 249 million miles away.

"It's kilometers, not miles," says John Wright, who has computer and engineering degrees from Purdue and Wright State. "We're JPL. We're on the metric system." He has several titles, but what he does is drive Mars rovers that are 400 million kilometers away.

[+] Burnouts are awesome in roughly one-third of Earth's gravity. [-] Roadside assistance is not an option.

JPL is where audacious science is conceived, but it's also home to blue-collar space work. Its engineers design the world's most exotic semi-autonomous vehicles, then blast them to other worlds.

Opportunity's twin, *Spirit*, took a Martian dirt nap in 2010. *Sojourner*, the first Mars rover, landed in 1997 and lasted close to three months before becoming the first junked rover on another planet. *Curiosity*, *Opportunity*'s younger, bigger, plutonium-powered brother, is still going strong but isn't even five years old yet. *Opportunity* is the graybeard, the Tin Lizzie of extraterrestrial exploration.

Opportunity has been cruising Mars' Meridiani Planum on its six individually suspended aluminum wheels since January 2004. It's almost two feet wider and more than seven feet shorter than a Mini Cooper, with electric motors in each wheel. It scoots its 374 pounds (on Earth, 141 pounds on Mars) of scientific instruments, sampling arm, lithium-ion batteries, cameras, and control computers to its seven-feet-per-minute top speed almost instantly. That's nearly 0.08 mph, to those of us not working at JPL.

"When we put together the proposal for the mission," explains Wright, "we said: 'Okay, you give us \$800 million and we will design two rovers. We'll build them, we'll

MARS OPPORTUNITY ROVER

VEHICLE TYPE: 6-motor, all-wheel-drive, 0-passenger, 0-door rover
COST: \$820,000,000*
MOTOR TYPE: brushed DC
POWER: 0.023 hp
TORQUE: 58.3 lb-ft
COMBINED POWER: 0.14 hp
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DIMENSIONS
WHEELBASE: 44.4 in
LENGTH: 62.4 in
WIDTH: 90.0 in
HEIGHT: 58.8 in
PASSENGER VOLUME: The truth is out there
WEIGHT: 374 lb
WEIGHT ON MARS: 141 lb
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DISTANCE DRIVEN SINCE LANDING: 26.7 mi
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fly them, we'll land them and drive them around for 90 days each. If you want one more day, it's going to cost you more money.' We never built them to last only 90 days." That would be a \$3 million rover with a \$397 million destination charge.

Still, *Opportunity* wasn't built to last *this* long. It has been operating on Mars for 12 years and nine months (about 4780 sols, or Martian days). It's way out of warranty, even though it's only traveled a bit more than 26 miles (42 kilometers).

Driving on Mars is really driving. But depending on orbital mechanics, radio signals can take up to 24 minutes to trudge to Mars, so real-time joysticking is impossible. Instead, *Opportunity* operates on a digital instruction set, brewed in a negotiation between the scientists studying the planet and the rover drivers.

"Ordinarily we will send up one day's worth of activities," Wright says. "If the scientists want to do something, we explain to them what it's going to cost. The cost may be 'You want to drive over here, but we can't drive straight over there. We're going to have to go over here and then over there and come up from behind... and it's going to take five days. Are you willing to spend five days to get to that place?'"

Each day the rover submits a vehicle status report from its inertial measurement tools to JPL. The report is verified using "visual odometry" photos to assess whether the rover slid while moving across Martian sand. Hooning, apparently, is even less funny to JPL engineers than it is to mall cops.

The subconscious compensations made when driving on Earth are conscious decisions on Mars. Cameras aboard the rover see about 50 meters out with detail but get blurry beyond that. Stereo photography and a pair of 3-D glasses reveal ridges undetectable in two dimensions.

Every move the rover makes is distinct. To turn, *Opportunity* stops, then steers, then proceeds. Because some transistors are shared between functions, it's often impossible to do two things at once.

The drivers build computer simula-

tions of the environment and plot routes through it, finding new roads every day. Driving into an unknown void could turn *Opportunity* turtle and render a spectacularly successful scientific instrument useless.

The rover has built-in smarts and can drive itself within the constraints of its software. "Our knowledge of what's on Mars is not perfect," Wright sighs. "*Opportunity* has some relatively non-deterministic behaviors because we tell it, 'You look out for rocks, you pick a safe route.' And it may turn left or it may turn right or it may back up and give up."

JPL's rover drivers are constantly refining the Linux-based graphic software they built to control the rovers. Frequently used commands are given by pressing on-screen buttons, and much of the rough mapping work is accomplished by point-and-click mouse moves. Driving the rover means refining and running simulations until every Martian pebble is accounted for. Hopefully.

"I was driving *Opportunity* a couple weeks ago, and we were parked on about a 30-degree slope. They wanted to go up about 20 centimeters so we could reach this target," recalls Wright. "We spun the wheels for 20 meters and made only about nine centimeters of progress." If Mars ever needs a John Force, Wright has the credentials.

Like any poorly maintained 13-year-old vehicle, *Opportunity* is ragged. The right-front wheel stopped steering years ago, so it has developed a push. The rover often travels backward and drags that wheel. The flash memory has developed "flaky errors," so the drivers often rely on short-term RAM that disappears when the machine goes to sleep. No one sleeps until the day's data has been transmitted.

Mars has no GPS, no roads, and virtually no electromagnetic field to repel radiation. During the day it can be 70 degrees Fahrenheit, but at night it drops to 100 below zero. No machine should last there. But *Opportunity* has been on the planet for more than a decade, thriving in the universe's toughest driving environment. Long may it run. ■



tech highlight

THIN SKINNED

Opportunity's aluminum wheels are in good shape after 12 years on Mars, but its brother *Curiosity*'s have developed holes in them after four. That's due to three factors, explains Richard Rainen, chief mechanical engineer on the next rover: "The loads on the wheels, the design of the wheels, and the terrain."

At 1982 pounds (on Earth), *Curiosity* is more than five times the weight of *Opportunity*, and the drive actuators in the six wheels can generate up to 494 pound-feet of torque. More weight and torque means greater loads.

Rover wheels are machined from 7075-T73 aluminum—10.2 inches in diameter on *Opportunity* and 19.7 on *Curiosity*. And to keep mass down, *Opportunity*'s wheels' skins are just 0.02 inch thick; *Curiosity*'s are 0.03 inch.

But the big difference in wear is due to the fact that *Curiosity* landed at Gale Crater in a field of sharp rocks that tear into the wheels.

Opportunity leaves behind a flat spot in its tracks from bolt holes where the rover was attached to its lander. And *Curiosity*'s treads leave behind Morse code spelling out "JPL."

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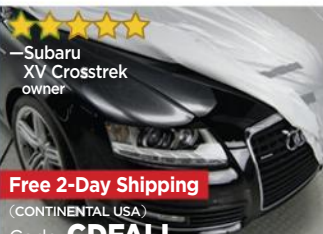
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What I'd Do Differently

Derek Bell, 74

The five-time Le Mans winner's 45-year career spanned Formula 1 to Can-Am to sports cars. He now lives in Florida and helps hawk Bentleys.

► interview by MIKE DUFF



C/D: Did you find it easy to get into racing?

DB: Not at all. These days it's all karts and feeder series, but there was none of that; I was working on a farm. One day I saw an ad for the Jim Russell Racing Drivers School, so I applied. They said yes, as I was paying, but it was at Snetterton, 180 miles from the farm. It was a pound a lap and 10 pounds to "learn" a corner, driving through it in Lotus 18s. I was only earning 20 quid a week, so I couldn't do it often.

■ It worked. Ten years later you were turning down a Formula 1 drive with Cooper for a Formula 2 drive with Ferrari.

□ Cooper said they wanted to offer me a contract, and I thought I'd pick up a decent sum of money, 50,000 quid or something like that. Then the discussion with a guy called

Major Owens. He was saying they'd had a shitty year, their income had fallen, he's making all these excuses, and so my expected 50 was dropping to 20 then 10 then even lower; I hadn't mentioned a number yet. Finally the offer came: "Let's say a nominal sum of 5 pounds." They wanted me to sign my Formula 1 contract for five quid! At least Ferrari were paying.

■ How did you get on with Enzo Ferrari?

□ Very well. I could speak French, so we didn't need a translator. When I got to the factory there wasn't a soul there. It was magnificent—cars on the red-tiled floor and sitting on chassis stands, everything immaculate. Nobody was working; the secretary said it was a holiday. As time went on, I realized that meant they were all on strike.

I'm walking past the assembly line when the Old Man comes around the corner, raincoat over his shoulder and his silver hair immaculate. I'll never forget that.

■ Did you feel lucky to have survived an era that killed so many drivers?

□ I was always very nervous before a race, but once the flag dropped you forgot all about it. I'm not ruthless, I'm not brave. The only thing I do is drive cars fast because I know I can; they don't scare me. I was never the best in the world, but I knew that I had ability, that I was pretty good.

■ You had a few Formula 1 drives and competed in everything from Can-Am to touring cars, as well as decades in sports cars. Which was the scariest car?

□ I'd say hairy rather than scary. Probably the Porsche 935, because it wasn't meant to do what it did. You had to manhandle it. The car didn't want to turn; the tires were about 18 inches wide at the back; you had the engine behind the centerline of the rear wheels and it's pushing out 750 horsepower. I don't remember many of us having accidents in them—well, apart from the obvious one when my teammate [Rolf Stommelen] died in the car I'd just got out of. Generally speaking, we didn't make mistakes in them because you couldn't. It was a hell of a thing, an absolute animal.

■ You stayed after your first Le Mans race (1970) to drive in the film Le Mans. What was Steve McQueen like to work with?

□ We had a lot of laughs. We had a good time. It wasn't parties as such; on that movie everyone was desperate to make it work. Steve's money was going down the tube. David Piper lost a leg, I got burned, all sorts of things happened. It was pretty bloody serious. We were driving at racing speeds day after day. We never went slowly.

■ You went on to win Le Mans five times and even drove there alongside your son, Justin Bell. Which 24 Hours do you remember best?

□ I couldn't really tell the wins from each other. Well, not the four with Porsche. I'd say probably 1995 with McLaren. I wasn't going to drive, I'd retired, but then I got a call from

Justin saying they needed me. We qualified in 13th place and then it piddled with rain and the top cars all fell out, and by 10 o'clock we were leading. In the end we finished third. It was a remarkable performance.

■ With such a long Porsche association, how did you end up working with Bentley?

□ I'd always wanted to work with a manufacturer, and when Bentley told me about everything they had lined up—Le Mans, a huge investment—I pretty much bit their arm off. You get the odd person, normally a Brit, who still says, "You've joined the Germans," and I always say that without German investment there wouldn't be a Bentley, get that straight.

■ What would you do differently?

□ How can anybody having had a successful and enjoyable and basically accident-free 45 years of racing say he would have changed it for anything else? I would love to have had a chance to do Formula 1 in a competitive car, but if I had, I might have missed out on other stuff. I wasted two years screwing around on the edge of Formula 3 with a shitty car, but I was still gaining experience. It all helps to carry you forward. ■

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THE TALE OF THE 50TH ANNIVERSARY

2017 CAMARO

AS TOLD FROM AN ENGINEERING AND DESIGN PERSPECTIVE.

Most things come and go and don't leave a mark. But some things leave such a mark that we measure our lives by them.

Such is the Chevrolet Camaro. Here, Chief Engineer Al Oppenheiser and Design Director Tom Peters share some of the essence of Camaro. Which leads us to this, the 50th Anniversary Edition.





TOM PETERS

CHEVROLET DIRECTOR OF EXTERIOR DESIGN -
PERFORMANCE VEHICLES

How would you describe the appeal of Camaro over the years?

There's something intrinsic in the shape and character of it. It's more than a good-looking machine. It's a unique personality that people want to be associated with. It's the same appeal that a young kid has for a cool car. I don't know another way to put it. And it's kind of wonderful.

Tell us about your design history with Camaro.

I started around 1984-85. I remember working on the IROC-Z in the Chevy 3 Studio under Jerry Palmer. I've been involved with Camaro ever since, especially Gen Five and Gen Six.

Tom, you have been front and center with Camaro designs for many years now. What did you wish to accomplish with Gen Six?

We wanted to modify the platform to achieve proportions that I think were critical to the success of Camaro. For me, Gen Six is all about responding to what we learned from Gen Five on the street. We set out to create a sculptural form that reflected the mass reduction, aerodynamics and just pure beauty.

“We set out to create a sculptural form that reflected the mass reduction, aerodynamics and just pure beauty.”

Tom Peters

CHEVROLET DIRECTOR OF EXTERIOR DESIGN - PERFORMANCE VEHICLES



AL OPPENHEISER

CAMARO CHIEF ENGINEER

What makes the 50th anniversary of Camaro significant?

The 50th is so important because we all grew up with Camaro. I've always said that you don't have to go very far to find someone who owned a Camaro, whether it was you, your brother, your dad, your girlfriend, buddy, whoever.

What's the DNA of Camaro?

It's always been about performance. Design wise, it's the strong shoulders, the long dash to axle, the aggressive windshield. No matter what generation you have, from 1967 until today, you get in and it just makes you smile.

Talk to us about some of the powertrain offerings in Gen Six.

It's all about lighter, meaner and leaner. I love them all, but I'm particularly proud of the new 2.0L Turbo 4-cylinder. It's anything but a base car. It's designed for people who love 4-cylinder tuner technology. We've upped the 3.6L V6 to 335 horsepower with fuel-saving technology¹ like Active Fuel Management.^{TM2} The available 6.2L V8 in the SS takes you up to 455 horsepower with the same kinds of fuel-saving technologies³ And the Gen Six ZL1 is the most phenomenal execution of design, performance, aerodynamics and technology I've ever seen.



¹ EPA-estimated MPG city/highway: Camaro LT with 3.6L V6 engine and 8-speed paddle-shift automatic transmission 19/28; Camaro LT with 3.6L V6 engine and 6-speed manual transmission 16/26. ² Requires available 8-speed paddle-shift automatic transmission. ³ EPA-estimated MPG city/highway: Camaro SS with 6.2L V8 engine and 8-speed paddle-shift automatic transmission 17/27; Camaro SS with 6.2L V8 engine and 6-speed manual transmission 16/25.

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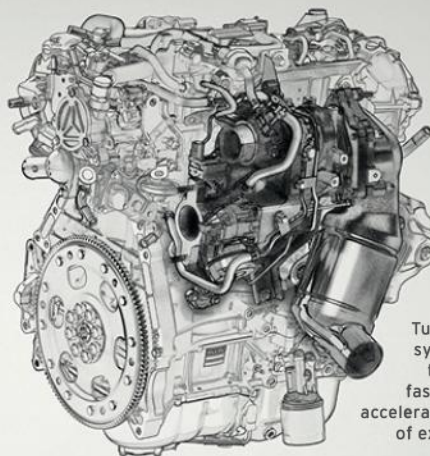
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